"THE LITTLE GIANT"

TOXICOLOGY

BRUNDAGE

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A MANUAL

OF

TOXICOLOGY

A CONCISE PRESENTATION OF THE PRINCIPAL FACTS RELATING TO POISONS, WITH DETAILED AND DESCRIPTIVE DIRECTIONS FOR THE TREATMENT OF POISONING A TABLE OF DOSES OF THE PRINCIPAL AND MANY NEW REMEDIES AND VARIOUS STATISTICAL TABLES

By

ALBERT H. BRUNDAGE, A. M., M. D., Phar. D., M. S.

Consulting Toxicologist to the Bushwick Hospital. Medical Inspector and Lecturer, Department of Health of the City of New York. Major, Medical Staff, Police Reserve, City of New York. Assistant in Immunotherapy, Polhemus Clinic, Long Island College Hospital. Visiting Physician, Jamaica Day Nursery. Examining Surgeon and Secretary, Board of Examining Surgeons (Queens County, New York), U. S. Bureau of Pensions. Formerly: Professor of Toxicology and Physiology in the Departments of Medicine, Dentistry, and Pharmacy of Marquette University; President of the Board of Pharmacy of the State of New York, and Examiner in Toxicology in same; Etc. Honorary Member of the Brooklyn Medical Society. Life Member of the New York State Pharmaceutical Association. Member of: The American Medical Association; the American Association for the Advancement of Science; Etc.

FOURTEENTH EDITION
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no 1

DEDICATED TO THE MEMORY
OF
MY MOTHER,

SARAH MERVINA BRUNDAGE,

WHOSE ATTAINMENTS AND NOBILITY OF CHARACTER HAVE BEEN THE INSPIRATION AND BENEDICTION OF MY LIFE.

PREFACE TO FOURTEENTH EDITION

In this edition the author has endeavored to better provide for the increasing demand for comprehensive information concerning poisonous foods, common, habit-forming narcotic poisons, and certain vegetable and animal proteins which poison thru being inhaled.

He has also incorporated much extended information concerning "mad-dog-bite." Apparently, by so doing he could best cooperate with the very active efforts of the Department of Health of the City of New York, and of other organizations, in the saving of life, by the dissemination of information concerning rabic virus, rabic symptoms, and the proper protective and preventive measures as well as the alleviating treatment to be employed against the deadly effects of the rabic poison.

Treatments of various poisonings have been revised. Certain data and measures, of service in the determination or treatment of some poisonings, have also been introduced as new text or in the auxiliary matter.

ALBERT H. BRUNDAGE.

New York City, August 8, 1922.

PREFACE TO TWELFTH EDITION

It has been suggested that the reason for employing the red and white cover used for this book is not generally understood and would be of interest to some of those who use it:

Some time before the publication of the first edition of this book, there were very many poisonings by virulent poisons; especially by morphine and its salts, through the latter being mistaken for quinin sulphate or for other comparatively harmless drugs, or through the careless and indiscriminate use of such poisons, for anodyne, soporific or other hazardous purposes, by the general public; there was also a notable increase in the prevalence of the morphine habit and associated habits. These matters were the subject of very active and widespread discussion. To remedy the laxity in laws relating to these matters, and thereby materially modify the existing menace to public health and to life, many States, including New York, passed laws, carefully restricting the sale of these poisons, and designated a special and very conspicuous poison label for them. In New York, the Penal Code was amended to require that all packages containing morphine or its salts, should be labeled with a scarlet colored label, with the name of the contents in white letters. As such labeling became generally known, the label served as an instantaneous and impressive warning of deadly poison; truly a danger sign in medical, pharmaceutical and related matters, just as a red flag is recognized as a danger sign in matters relating to transportation, structural, and various other interests.

The author thought that if the cover of this book was made to imitate the gross appearance of such label it would be instantly recognized by many as a danger sign, and emblematic of virulent poisons; therefore quite readily understood to indicate that the contents were a treatise on poisons. After careful consideration such cover was adopted.

In this new edition, various text features have been revised, and many new and important facts have been introduced, in the effort to bring the book fully up to date. It is hoped that its usefulness will have been thereby proportionately enhanced.

ALBERT H. BRUNDAGE.

September 6, 1920.

PREFACE TO SEVENTH EDITION.

In this seventh edition, the author has endeavored to make more or less material alterations and additions without appreciably increasing the bulk of the book. He has striven to keep in view the original plan of having it compact and strictly manual in size, but comprehensive in scope.

As heretofore, elegance of diction and conventionality of typographical and other forms have been made uncompromisingly subordinate to economy of space, directness in statement and the most serviceable emphasis.

The author has hoped to produce a practical, truly serviceable manual, and if those into whose hands it comes, consider it to be possessed of these admirable qualities, his efforts will have been compensatingly fruitful.

The hearty and very generous recognition accorded the book by college professors, experts, physicians, pharmacists and others, is most highly appreciated by the author.

ALBERT H. BRUNDAGE.

BROOKLYN-NEW YORK, N. Y., June 1, 1909.

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A MANUAL

—OF—

TOXICOLOGY.

PART I.

GENERAL CONSIDERATIONS.

Toxicology is the science of poisons; i.e., the science which treats of the nature, properties, effects, and detection of poisons, and the treatment of poisoning.

A Poison (in a strict sense, i.e., **a True Poison**) is any substance which upon entering into solution in the circulating blood or by chemically acting upon it is capable uniformly of producing serious bodily injury, disease or death (e.g., arsenic, alkaloids, toxins, chloral); or (in a broad sense), is any substance which, independent of any mechanical action, uniformly causes serious bodily injury, disease or death, when applied to, introduced into, or developed within the body (e.g., "True Poisons," mineral acids, alkalies, etc.).

A person's individual susceptibility, i.e., idiosyncrasy, or his diseased state, whereby a certain substance injures him or causes his death but does not so affect others in health, does not warrant classifying that substance as a poison; nor does the avenue of body entrance (by mouth or otherwise); but, in order to be classed as a poison, its effects must be uniformly injurious to persons in health.

It has been proposed (not generally adopted) to recognize as a poison any substance which produces harmful effects in quantity of a drachm or less.

A Corrosive Poison is one which by contact, chemically causes local destruction of tissue. When swallowed, it usually produces nausea, vomiting, and great local distress. **A Corrosive Poison** is not

N. B. Special attention is called to N. B., page 61.

strictly a true poison. If highly diluted with water it ceases to be corrosive (e.g., Nitric Acid).

A True Poison is still poisonous no matter how highly diluted (e.g., Atropine, Strychnine, etc.).

A Cumulative Poison is one which increases suddenly in its intensity of action after slow additions of it (e.g., Digitalis).

THE LEGAL DEFINITION OF "POISON."

The legal definition of **"POISON"** is very succinctly and clearly stated by Kobert as follows:

The statutes of the State of New York and those of the United States, do not define the word "poison." Words are there used to indicate their general meaning, unless something is found in the context to denote some special or restricted use.

According to its generally received meaning, we can say: In most cases a poison is a substance which, when given even in small doses, owing to its chemical constitution, is capable of destroying health or life.

The following statement, by Herold, very concisely expresses the generally accepted scientific and legal views of this matter:

A Poison is a substance which, when applied to the body externally, or introduced into the system either by the mouth, rectum, vagina, skin, lungs, etc., without acting mechanically, but by its own inherent qualities, is capable of altering or destroying some or all of the functions necessary to life.

The intent with which such a substance is given enters into the legal conception of a poison. The law never regards the manner in which a substance acts, and it is of little consequence, so far as the responsibility of the accused person is concerned, whether its action on the body be of a mechanical or of a chemical nature, so long as the substance administered is capable of causing disease or death. Broken or crushed glass, needles, pins, and like bodies are not poisons in the medical signification of the term; yet, when taken inwardly, may be destructive to life. Any substance which causes disease or death, given with homicidal intent, may be regarded as a legal definition of a poison.

The English law declares that: "Whoever shall administer, or cause to be administered to, or taken by any person, any poison or other destructive thing, with intent to commit murder, shall be guilty of felony." And also: "That whosoever shall unlawfully or maliciously administer to, or cause to be taken by, any other person any poison or other destructive or noxious thing, so as thereby to endanger the life of such person, or so as thereby to inflict upon such person any grievous bodily harm, shall be guilty of felony;" and "Whoever shall unlawfully apply, or administer to, or cause to be taken by, any person any chloroform, laudanum, or other stupefying or overpowering drug, matter, or thing, with intent, in any such case, thereby to enable himself or any other person to commit, or with intent, etc., to assist any other person in committing, any indictable offence, shall be guilty of felony."

The German statute provides that: "Whoever wilfully administers (beibringt) to a person, for the purpose of injuring health, poison, or any other substance having the property of injuring health, will be punished by from two to ten years' imprisonment. If by such act a serious bodily injury is caused, the imprisonment is not to be less than five years; if death is the result, the imprisonment is to be not under ten years or for life."

If the death is wilfully caused by poison, it comes under the general law: "Whoever wilfully kills a man, and if the killing is premeditated, is on account of murder punishable with death."

The French law (Art. 301, Penal Code) says: "Every attempt on the life of a person, by the effect of substances which may cause death, more or less suddenly, in whatever manner these substances may have been employed or administered, and whatever may have been the results, is called poisoning."

There is also a penalty provided against any one who "shall have occasioned the illness or incapacity for personal work of another, by the voluntary administration, in any manner whatever, of substances which, without being of a nature to cause death, are injurious to health."

Blyth's scientific definition of a poison is: "A substance of definite chemical composition, whether mineral or organic, may be called a poison, if it is capable of being taken into any living organism, and causes, by its own inherent chemical nature, impairment or destruction of function."

Acute Poisoning is produced by taking an exces-

sive single dose of a poison, or several smaller doses with such frequency as to result in prompt and marked disturbance of function or death within a definite time.

Chronic Poisoning is produced by taking or absorbing for a protracted period small doses of a poison, thereby producing gradual but progressive deterioration of function or tissue (e.g., By lead, morphine, etc.)

An Antidote (in a general sense) is any agent which neutralizes a poison, or otherwise counteracts or opposes it or its effects. It may either so alter a poison as to make it harmless, remove it from the body, mechanically prevent its absorption, or so act upon the functions of the body as to more or less overcome the effects of its absorption. There are three kinds of antidotes: Chemical, Mechanical, and Physiological.

A Chemical or True Antidote is one which makes the poison insoluble or harmless by chemically altering it. **(It acts directly upon the Poison.)**

A Mechanical Antidote or Antidotal Measure is one which removes the poison without changing it, or so coats the stomach or mechanically suspends the poison that absorption is prevented. **(It acts directly upon or against the Poison.)**

A Physiological Antidote or Antagonist is an agent which so acts upon the system as to counteract, more or less completely, the effects of another substance (e. g., atropine counteracts the effects of morphine, to a certain extent). **(It acts directly upon the functions of the body.)**

In a strict sense, a measure which tends to overcome the remote systemic effects of a poison, (as artificial respiration, cold affusions, etc.), is not an antidote, but a **Physiological** or **Antagonistic Measure.**

A Medicine is a substance administered to correct a disordered or diseased state of the system.

Posology treats of the form and quantity of medicine to be administered at one time, or within a certain period.

A Dose is the quantity of medicine to be administered at one time or within a certain period, usually

a day. It may be a single, or daily dose, a safe, or poisonous dose, a minimum, or maximum dose, a mouth, hypodermic, or rectal dose, etc.

Only a certain amount of some medicines may safely be administered in twenty-four hours; therefore, the daily dose may be disproportionate to the single dose. (See dose tables in Appendix.)

A Safe Dose may be useless if too small; consequently a dose called the **Minimum Dose** is fixed as the smallest amount from which physiological effect is commonly assumed to result, or beneficial action upon the sick is secured.

No arbitrary quantity of a poison can be stated above which it is poisonous, and below which its effects are both safe and salutary. (2 grains of arsenic or ½ ounce of oxalic acid may be fatal.)

A Toxic or Poisonous Dose is the dose that is harmful to both the healthy and the sick, but is not fatal. It begins where the limit of safety, commonly called the **Maximum Dose,** ends.

A Lethal or Fatal Dose is the dose which kills, and although ordinarily more, may. under certain conditions, be less than the ordinary maximum dose.

Considering the foregoing facts, **it is important that the Minimum** and **Maximum Doses of medicines be well known,** and especially that the **Maximum Doses be not exceeded** except for some special reason, **lest poisoning result.***

EFFECTS OF POISONS.

Poisons may have local or remote effects, or both.

The **local** effect of a poison is the impression made directly upon that part of the body with which the poison comes in contact: Such as corrosive effects produced upon stomach and intestines by immediate contact of concentrated mineral acid or caustic alkali; or irritative, inflammatory, or local specific effect of such substances as corrosive sublimate or aconite.

The **remote** effect is the impression made upon a

* The author has arranged a *Table of Doses* of the principal and many new remedies. This table will be found *in the Appendix.*

distant part of the body (e. g., belladonna taken into the stomach produces paralysis of the ciliary nerves resulting in dilatation of the pupil of the eye). The usual symptoms of poisoning are the remote effects of the poison.

Certain poisons, such as arsenic, carbolic acid, potassium cyanide, etc., have both local and remote effects; e.g., arsenic has a local effect upon the stomach, and a remote effect upon the brain; cantharides locally produces blisters, remotely influences the kidneys and bladder, causing strangury and sometimes bloody urine.

A Poison, unless it be a corrosive poison, must first pass into the circulating blood, be incorporated or dissolved in it or chemically act upon it, and the poison or altered blood then be carried (circulated) to distant parts of the body, in order to produce the full poison-effects upon the system. Some poisons are more rapidly taken into the general circulation than others. The corrosives often produce local effects so severe as to cause death.

Poisoning cannot occur by nervous communication or by simple approximation of tissue.

We know that poisons are absorbed into the circulation because we find them in the blood, secretions, and various organs of the body, such as the kidneys, liver, spleen, brain, lungs, etc.

Some poisons are absorbed without undergoing any change, and pass out of the circulation and body still unchanged. Some are chemically altered during absorption, or in the blood or organs, and thus destroyed. The liver actively protects the body against poisoning. It arrests most of the poisons brought to it through the portal vein: arrests morphine, strychnine, atropine, cocaine, and various other alkaloids, ammonia, putrid poisons, toxic products of intestinal fermentations, mineral poisons, etc. Some poisons it modifies, some it stores up (various mineral poisons, etc.), and some it eliminates. When a poison enters the blood it probably causes some change in that fluid. Some poisons so

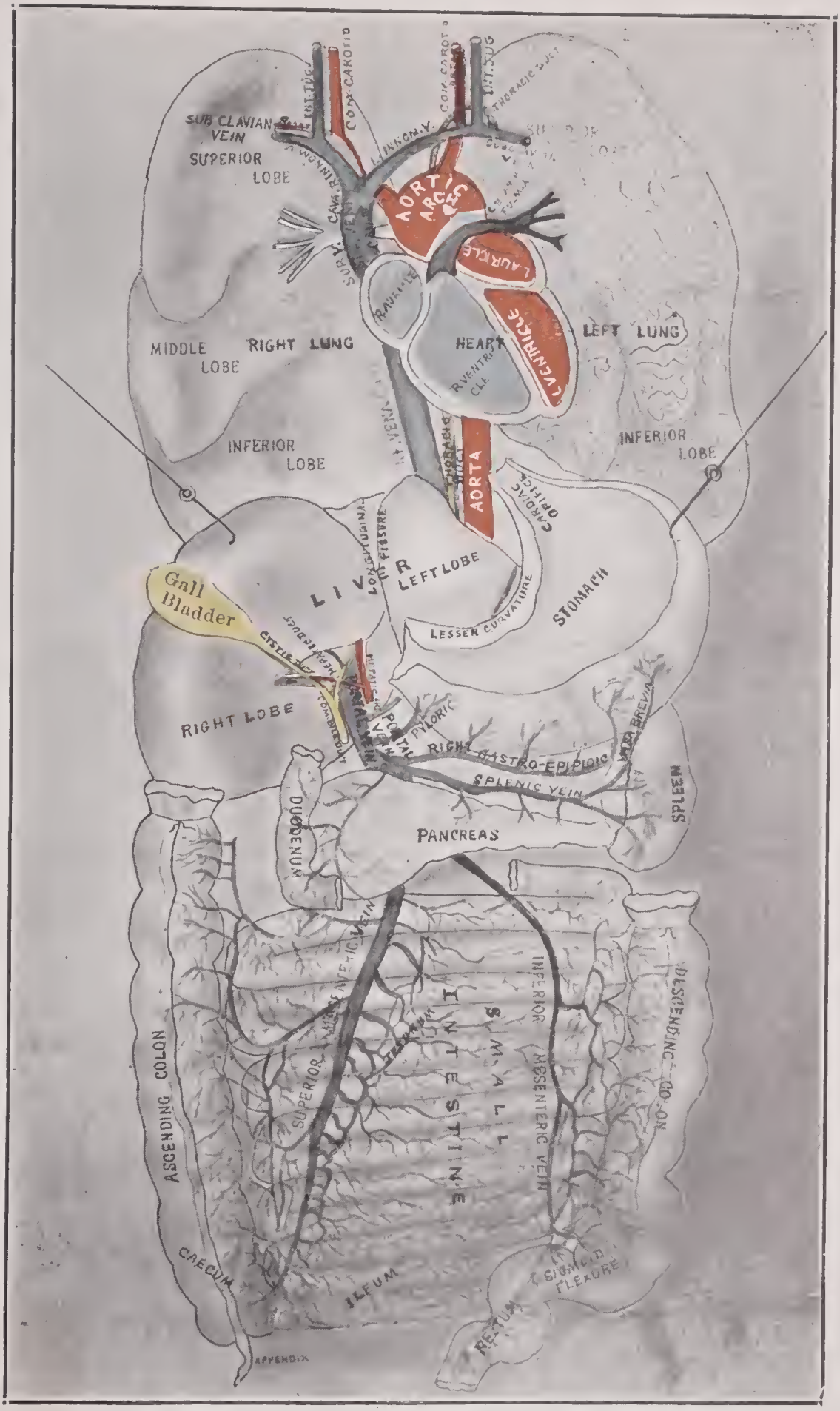
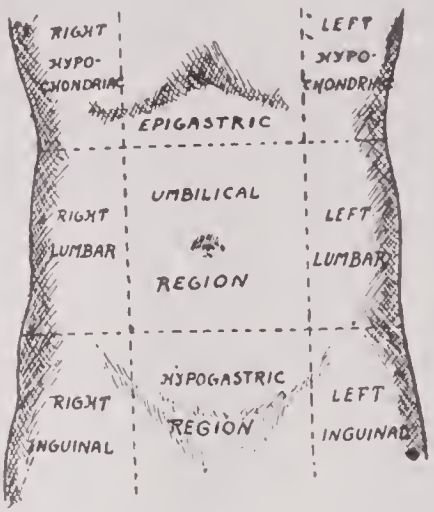
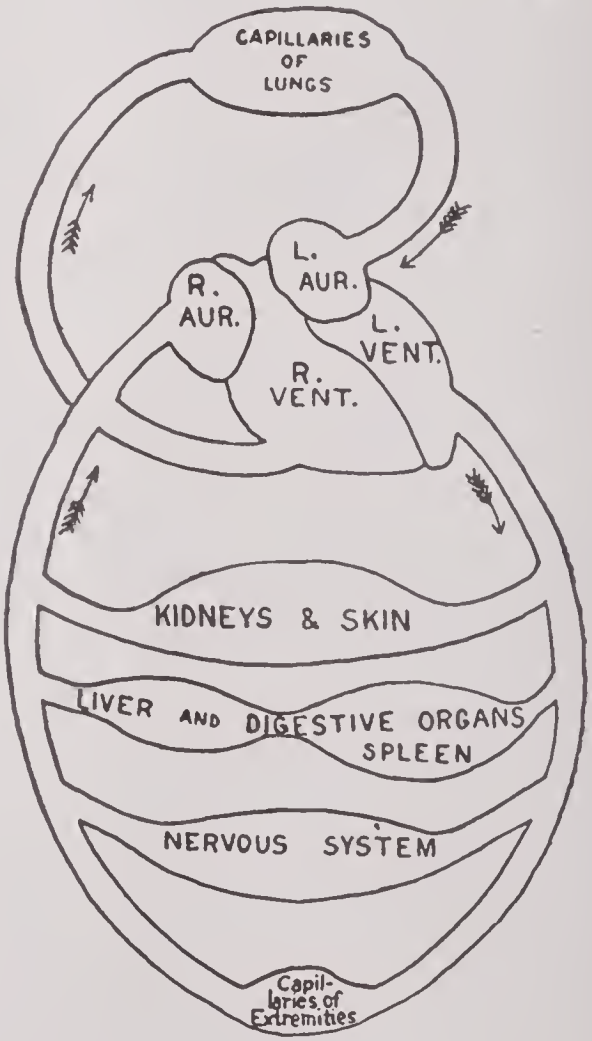


Diagram showing chief organs concerned in absorption and circulation of poisons. (See pages 16 to 21.)



Abdominal Regions



Diagrammatic scheme of circulation. (See pages 16 to 21.)

alter the blood as to make it unfit to perform its functions. (See also Part IV.) According to Da Costa, the following blood effects have been recognized:

Substance.	*Effects.*
Alcohol,	Anemia, often leucocytosis.
Amyl nitrite,	Methemoglobinemia.
Acetanilid,	Methemoglobinemia.
Ammonium hydroxid,	Leukocytosis.
Antipyrin,	Methemoglobinemia.
Bromin,	Methemoglobinemia.
Chloral,	Leukocytosis.
Chromic acid,	Methemoglobinemia.
Ether,	Oligochromemia,
Guaiacol,	Hemocytolysis, leukocytosis.
Hydrogen cyanid,	Methemoglobinemia, [mia.]
Illuminating gas,	Methemoglobinemia, polycythe-
Iodin,	Leucocytosis,methemoglobinemia
Lead,	Anemia, granularbasophilia, often leukocytosis.
Nitrobenzene,	Methemoglobinemia, megaloblastic anemia.
Nitroglycerin,	Methemoglobinemia.
Phenacetin,	Methemoglobinemia.
Phosphorus,	Polycythemia, occasionally leukocytosis.
Potassium chlorate,	Methemoglobinemia, anemia, leukocytosis.
Sodium nitrite,	Methemoglobinemia.
Poisonous mushrooms,	Hemoglobinemia.

In toxicological examinations, it is important to find the poison in some of the body secretions or organs.

Poisons may be absorbed with remarkable rapidity, especially if hypodermically injected.

The rapidity of absorption depends upon—

1. **The solubility of the poison.**

If it is absolutly insoluble it cannot be absorbed. But although insoluble in water it may be soluble in the fluids of the alimentary canal and consequently be absorbed.

There are some poisons of an animal nature, which, if swallowed, seem to undergo a change by digestion or otherwise which makes them practically harmless: (e. g., the virus of glanders, smallpox, syphilis, etc.). [After burial, arsenic, etc., may enter body from soil, etc.]

2. The character of the surface to which the poison is applied.

Poisons may enter the system through the skin, as by the use of washes and salves (e. g., such poisons as arsenic, tartar emetic, corrosive sublimate, opium, etc.).

If the skin is removed beforehand, the absorption is of course more rapid. If the surface is rich in blood vessels and the intervening walls thin, the poison is likely to be very promptly taken up. When poisonous vapors or gases are inhaled, the effects are exceedingly prompt, because of the rapidity of absorption in the respiratory tract. Poisons act more rapidly when given by the mouth than by the rectum; and still more so when given by hypodermatic injection; when injected directly into the blood vessels of the body they have an almost instantaneous effect. A poison taken into the stomach when the latter is full of food usually acts very slowly, or may expend its power upon the contents (potassium permanganate introduced into a stomach containing much organic matter expends its oxidizing power upon such matter); but if the stomach is empty the action usually is very prompt, and apt to be directed against the walls of the stomach.

The lungs may absorb fine dust.

[Apparently arsenic oxid and trioxid have only a local effect if given subcutaneously, but by mouth poison.]

3. The quantity of blood in the blood vessels.

If the vessels contain but little blood, the poison is more rapidly absorbed. The less circulating fluid there is, the more rapid the absorption. Therefore, bleeding or purging will favor absorption by producing depletion of the vascular system.

It is evident that the fatal effects of a poison are due to absorption, inasmuch as the poisoning continues as long as the blood circulates between the place where the poison has been introduced and the organ affected by it. Also by the fact that the effect ceases when the circulation, from the place where the poison was introduced, has been cut off. This has been proved by experiments upon animals.

As a poison, which has been absorbed into the blood, passes through the different organs of the

body, some of it is at once separated by them and promptly removed in their secretions, such as the **saliva, urine, sweat, bile,** pancreatic juice, etc. **The** kidneys remove many poisons, and should be **aided.**

Some of the poison may, however, be temporarily deposited in the liver, spleen, kidneys, heart, lungs, brain, pancreas, muscles, or bones. This is true of mineral and some vegetable poisons. Gaseous poisons are not deposited, but promptly removed by way of the lungs. Lead and some other mineral poisons are particularly inclined to deposit in the spinal cord and brain. These various depositions are invariably in the form of an albuminoid combination. A poison which is not known to have any selective action is most likely to be found in either the liver or kidneys.

Although only a small portion of a poison circulates in the capillaries at any one time, it is this portion which produces the poisonous effects. **That portion which still is in the stomach** or otherwise unabsorbed, or has been temporarily **deposited in the various organs, is harmless while it remains there.**

Hence, an **unabsorbed poison** in the stomach is **not the cause of death** as is commonly supposed. The **cause of death** is that portion of the poison which was **absorbed**; and the unabsorbed portion in the stomach is the surplus of what was capable of producing death. **Exception** is, of course, made regarding the **local action of corrosives.**

A poison which, for the time being, is deposited in the organs, is harmless while there, but nevertheless is a menace to life, as at any time it may be reabsorbed and thus become again active. Therefore, it is evident a poison should be removed entirely from the system as soon and as completely as possible.

The length of time required for the removal of **an** absorbed poison from the circulation, either by the secretions or by its being deposited in the organs **or** tissues, depends upon the poison and the state of the system. Potassium iodide, turpentine, antimony, and carbolic acid may often be found in the urine a

few minutes after being swallowed. It is believed that mineral poisons are rapidly separated from the blood. Lithium salts pass through the entire circulatory system within a few minutes after being given and may be detected in the perspiration. Arsenic has been found in the urine within an hour and an half and in the liver within four hours after it was taken. It takes nearly two weeks to remove it from the system. Antimony may be found four months, and lead and copper eight months after they have been taken.

Early vomiting and purging after only a moderate dose of poison may prevent the deposition of the poison, but without saving life, there being just enough poison absorbed to kill.

As the various **poisons** circulate throughout the body in the blood, they come in contact with the great centres of life—the heart, lungs, brain, and spinal cord, —and **exert their influence upon those organs, which are peculiarly sensitive to their actions,** or show their elective affinity for various organs and **produce their specific effects;** one, as opium, affecting the brain producing narcotism; another, as prussic acid or digitalis, the heart, producing asthenia; another, as strychnine, the spinal cord, producing tetanus, etc. Morphine given hypodermatically promptly seeks the stomach; mercury applied to the skin in the form of a salve promptly seeks the small intestine, etc.

We do not know why they so act any more than we know why different poisons prefer different methods of removal from the system; as, potassium iodide prefers removal by the urine, mercury by the saliva, arsenic by the stomach glands, lead by the secretions of the liver and kidneys, etc. (See Part IV.)

Death by poisoning may result **from shock** to the general nervous system, or from a specific disturbance of some vital organ or center of life, as **from paralysis of the heart, paralysis of the respiratory centers, asphyxia,** etc.

The strong corrosives produce death by shock through their severe local action, producing a gen-

eral depression of the system like that caused by a severe burn or other serious injury to the surface of the body. Most poisons cause death by producing a general devitalizing effect.

The effects of a poison may be modified by the physical state, quality, or mode of administration of the drug, the size of the dose, the association with other poisons, the age, sex, idiosyncrasy, habit, or mental or physical state of the individual, the condition of the stomach, and the character and amount of the stomach contents.

Men as a rule bear larger doses of medicines than women.

As a general rule, the larger and more robust the individual, the less easily he is influenced by drugs, and the greater his vital resistance.

Regarding mode of administration: dilute diuretics are more effective than concentrated ones; but saline purgatives are most effective when concentrated. Of alcoholic, watery and oily solutions, the first is most readily absorbed, the last least so. Hot solutions are usually more rapidly absorbed than cold ones. Dilution of a poison by water frequently favors its speedy absorption, hence the promptness and severity of its action; to this, corrosives are exceptions.

A poison is absorbed more rapidly in gaseous than in solid or even liquid state; consequently it is most active in gaseous, less active in liquid, and least active in solid state. It appears that alcohol, hydrocyanic acid, nicotine, etc., may enter the circulation directly through walls of lips, mouth, nose or stomach. A diseased or disordered stomach may delay absorption of a poison or prove highly susceptible to the action of an irritant poison; or acidity, alkalinity, or other character of its contents or the character of the vehicle in which the poison is given may determine the solution, absorption, destruction or intensity of action of a poison (e.g., an acid or alkali may be neutralized; corrosive sublimate, taken in milk or eggs, modified; mercurous chloride decomposed by an alkali thereby acting severely; etc.).

Certain toxalbumins, such as snake venom, are

almost or quite inert when taken into stomach, but very poisonous if introduced directly into the blood.

Some poisons are severely irritant in large doses.

Although some substances are very irritant poisons in large doses, in small doses are not; but if continued, gradually salivate (e.g., certain salts of mercury).

As a rule, the **larger the dose, the quicker and frequently more emphatic the action.** Some irritant substances, however, act as **emetics in large doses,** while **small ones have no emetic effect,** and consequently remain and poison (e.g., arsenic). A large dose quickly absorbed may exhibit so severe central nervous system effects as to obscure or prevent gastro-intestinal ones (e.g., arsenic).

A large dose of a poison may cause death in a different way from a small dose. Oxalic acid in large dose quickly produces death by shock; in small doses, slowly kills by its action upon heart and nerve centers.*

Combining poisons sometimes increases (as morphine with chloral), sometimes diminishes, their power; or, their action may actually be antagonized or neutralized by such combining. The action of one poison may be suspended by the action of the other.

The **antagonistic action** of poisons is well known. Certain poisons decidedly antagonize each other, one more or less neutralizing the effect of the other upon the system.

The antagonistic action may be either physiological or toxic. Calcium salts in poisonous doses will produce such contraction of a frog's heart that the animal dies—the heart contracted. Potassium salts in poisonous doses produce dilatation of the heart, and death in that state. A balance dose of the two salts will control the action of each salt, the physiological effects of one being neutralized by the other, so that the heart acts normally and the animal lives. There is a similar antagonism between the potassium salts and veratrine. Morphine, aconite, and conium are more or less neutralized, respectively, by atropine, digitalis, and strychnine. And atropine neutralizes strychnine. Furthermore, a combination of poisons may so

* For comments on fatal dose and cause of death, see page 319.

modify the action upon the system as to obscure the symptoms, and even interfere with the chemical tests.

As indicated in the foregoing, such conditions and peculiarities of the system, as **Habit, Idiosyncrasy,** and **Disease** also modify the action of poisons.

Habit, as a rule, lessens the effect of poisons; (e. g., opium, alcohol, arsenic, etc.) Gradual increase in dose of a poisonous substance, commonly, produces toleration of it, but habitués die from overdoses.

With vegetable substances, such as opium and gelsemium, it is usually necessary to increase the dose frequently to maintain the effects; however, with mineral substances, the contrary is, as a rule, the case; antimony and mercury cannot be long taken without risk.

Idiosyncrasy (constitutional peculiarity; distinctive characteristic; personal susceptibility or tolerance, respecting certain poisons) is noted when morphine, calomel, etc., are administered to some persons.

Some persons are affected by the tonic influences of even minute doses of arsenic; some are salivated by a minute dose of a mercurial; some are poisoned by a very small amount of turpentine. Other persons cannot take the iodides; with some, even quite dilute solutions of cocaine applied to any mucous membrane will cause severe symptoms of poisoning; opium produces wakefulness; etc. Some can take enormous doses.

Some persons are very susceptible to the effects of certain plants, while others are unaffected by them.

Some cannot take quinine, others opium or belladonna, etc. Some persons are made seriously ill by partaking of, or only smelling, substances which are very agreeable to others; among these are various drugs, and such foods as fish, eggs, honey, lobster, and other shell-fish, mutton, raspberries, strawberries, etc.; also the odors of musk or of sewer gas, the smell of various animals, the scent of flowers, etc. Among the symptoms produced are: Nettle-rash after partaking of raspberries, strawberries, tomatoes, crabs, or other red dishes; sneezing in the presence of the obnoxious animals; colic after cocoa; fainting, illusions,

and other nervous phenomena from the scent of the lily, rose, violet, hyacinth, etc.

Disease also modifies the action of certain poisons; as, opium in tetanus, peritonitis, delirium tremens, etc., where the power of the poison is diminished; or, as opium in apoplexy and inflammation of the brain, where tolerance of it is lessened. In paralysis, strychnine acts less readily. In typhoid fever very large doses of alcohol are tolerated. In organic disease of kidney, lessened eliminative power seems to increase susceptibility to poisons.

Sleep usually diminishes or retards the action of poisons, owing to diminished vital functions (e.g., arsenic and other irritants). Exhaustion usually increases the susceptibility to certain poisons, particularly those having a depressing effect.

In maniacs and in some convulsive disorders, sedatives may be almost inactive.

The **Evidences of Poisoning** may be divided into: 1. Circumstantial, or Moral; 2. Symptomatic; 3. Chemical; 4. Post-Mortem; 5. Experimental.

1. Circumstantial or **Moral Evidence** is that contributed by the circumstances or deduced from various occurrences and facts. Among these are motives for poisoning; the possession or purchase of the particular poison found; previous attempts to poison; active efforts for secrecy regarding medicine used, or matters vomited; undue haste in burial, etc.

2. Symptomatic Evidence is that contributed by the symptoms. It may be subjective or objective. While very important in determining a poisoning, it is, nevertheless, only presumptive evidence of it. There are no absolutely characteristic symptoms of any poison. If there were, symptoms would be determinative evidence, and chemical investigation unnecessary. The local action of strong mineral acids and alkalies may be somewhat of an exception.

*Inasmuch as most poisons act very promptly, the occurrence of severe symptoms, such as violent pain, vomiting, purging, convulsions, delirium or drowsiness, soon after a person, previously in a state of health,

*See also pages 251, 321.

has taken food or drink, indicates cause for investigation. And even if the symptoms come on gradually and are supposed to be caused by disease, they may be due to slow poisoning resulting from taking small repeated doses of a poison. Furthermore, the symptoms or other evidences of certain poisons resemble those of certain diseases or disorders. Irritant poisoning is simulated by cholera morbus, food poisoning, malignant cholera, gastro-enteritis, peritonitis, gastric and intestinal ulceration, strangulated hernia, etc. Narcotic poisoning is simulated by autoinfection, epilepsy, apoplexy, meningitis, tetanus, certain heart diseases, etc. It is also well known that intoxication will mask the effect of narcotics. Arsenic poisoning and cholera morbus give very similar symptoms. Opium poisoning may be quite readily mistaken for apoplexy or uremia. The symptoms of strychnine poisoning and tetanus are very similar.

3. Chemical Evidence is the evidence obtained by means of a chemical analysis of the substance supposed to have caused the poisoning, or of that which has been vomited, or of material found in some part of the body, or in its excretions.

The consideration of the physical properties of the suspected poison should be associated with the chemical investigation.

Poison found in the stomach has in some cases been introduced there after death. Care must, therefore, be exercised to exclude such possibility.

There is no known distinctive chemical test for certain poisons. Consequently those poisons cannot always be identified.

Furthermore, the poison may have been decomposed in the blood or tissues, or so thoroughly eliminated or otherwise removed as not to be discoverable.

The more unstable of the alkaloids and organic poisons are known to be oxidized while passing through the lungs. It is believed that many poisonous principles, which enter the blood, are either destroyed or their effects neutralized by the white blood corpuscles.

Sometimes the chemical investigation is interfered with by the presence of certain ptomains.

Ptomains (Animal Alkaloids, Cadaveric Alkaloids, or Putrefactive Alkaloids) are alkaloidal substances, resulting from the decomposition of albuminous materials under the influence of bacteria. Some ptomains are poisonous, the majority are not. Ptomains have been found in mussels, oysters, eels, sausage, ham, canned meats, etc. Tyrotoxicon is a ptomain from poisonous cheese, poisonous milk, poisonous cream, etc.

A **Toxin** is a poisonous substance or mixture of substances produced by bacterial action. It may be an alkaloid or proteid substance with poisonous properties, or a mixture. The term toxin is usually restricted to poisonous proteid substances produced by disease producing microörganisms—as diphtheria toxin, or tetanus toxin. In a crude way, bacteria may be likened to bees and toxins to their honey.

Food Poisons: Certain foods, when undergoing decomposition, may become poisonous from development of ptomains or toxins. Symptoms of food poisoning are usually those of a gastro-intestinal irritant.

4. **Post-Mortem Evidence** is that obtained by an examination of the organs and tissues of the body after death. In post-mortem absorption the poison is found chiefly in the external portion of the organ. In ante-mortem absorption the blood circulation and other vital processes would produce more uniform diffusion throughout the interior of the organ. If evident changes in the histological character of the organ are observed, it is presumptive evidence of ante-mortem introduction of the poison. Perforations produced by corrosives are invariably large and ragged, while those caused by disease are, as a rule, small with smooth edges. But, inasmuch as certain diseases simulate certain poisons, a post-mortem examination is not altogether a positive evidence of poisoning.

Redness, ulceration, softening of the mucous membrane of the alimentary canal, and perforation are the principal evidences encountered post-mortem

Irritants produce their chief effects upon the stomach and intestines, causing irritation, inflammation and corrosion; they sometimes produce ulceration, perforation, and even gangrene. They may cause thickening or thinning, and softening of visceral walls.

The post-mortem appearances resulting from the narcotic poisons are not well defined.

Poisons which are narcotico-irritant in their effects, may affect either or both the alimentary canal and brain. Death may result from irritants or narcotics without producing any appreciable post-mortem changes.

Redness of mucous membrane of stomach and small intestine may be post-mortem sign from the action of an irritant poison, or from disease, suffocation, drowning or strangulation. A deep red color of the stomach wall is sometimes caused by transudation of blood from liver or spleen. Gravitation of blood, also, sometimes causes a similar appearance in intestinal wall.

Ante-mortem symptoms or some chemical evidence is therefore important.

In ulceration of stomach from irritant poison, mucous membrane usually is destroyed in small circular patches, and redness from ulceration is diffused; not diffused when from disease. Stomach mucous membrane softening is not characteristic of poisoning. Disease produces same. When caused by corrosives, mouth, etc., will invariably show effects of poison.

Perforation may result from poison or disease, and follow corrosion or ulceration. As said, in perforation from disease, opening is usually small, oval or rounded, with smooth edges; from acids, large and ragged. The diaphragm, stomach, spleen, liver and other viscera sometimes spontaneously soften. The preceding facts indicate necessity for caution in drawing conclusions from post-mortem appearances.

5. **Experimental Evidence** is evidence obtained by administering the suspected substance to some living animal and observing the effects. Apparently only dog and cat similarly affected as man by same poisons, but fatal dose, rapidity of action, rate of absorp

tion, deposition or elimination of a poison administered to man cannot be determined by experiments upon the lower animals. But the administration of a suspected substance to a lower animal may serve as corroborative evidence of the poisonous nature.

But remember that: A rabbit can take more morphine and atropine than a man who weighs fifty times as much; amygdalin kills rabbits, but has no effect upon dogs; an adult man cannot bear as much strychnine as the smallest snail; insects are unaffected by many of the strongest heart poisons; hedgehog unaffected by bite of most venomous snake, and not injured by large doses of hydrocyanic acid or cantharides; although frog easily affected by the digitalis poisons, toad quite unaffected by them; dogs narcotized by morphine, but can take more than most men; it crazes cats, hares and cows; etc.

THE CLASSIFICATION OF POISONS.

It is almost impossible to arrange a satisfactory classification of poisons. In an ideal one the same poison would appear but once, and the line between each poison would be sharply drawn.

Some writers upon toxicology classify poisons according to the kingdoms; that is, as animal, mineral, and vegetable poisons. Poisons have also been classified as organic, mineral, and volatile poisons. But these classifications have proved unsatisfactory. A quite satisfactory classification, based upon the origin or nature of poisons, but somewhat less definite than the author's Chemical Classification, arranges poisons as: (1) Inorganic, (2) Alkaloidal, (3) Non-alkaloidal Organic, (4) Gaseous, (5) Food Poisons.

Poisons may very advantageously be classified either physiologically or chemically.

Physiological classification usual and most satisfactory. Is based upon effects of poisons upon healthy animal, or upon system when in healthy condition.

Chemical classification is a classification based upon chemical composition or chemical behavior.

The author herewith presents a physiological, also a chemical classification which, he believes, will be found useful. But for the reader's convenience, Tanner's Blyth's, Kobert's, and other classifications are presented also, for purposes of comparison.

PHYSIOLOGICAL CLASSIFICATION OF POISONS.

- **1. IRRITANTS.**
  - **True Irritants.** — Bromine; Cantharides; Carbolic Acid; Creosote; Croton Oil; Castor Beans; Chlorine; Compounds of Antimony, Arsenic, Copper, Chromium, Iron, Lead, Tin and Zinc; Food Poison; Gelsemium; Hellebore; Iodine, Mushrooms; Phosphorus; Ptomains; Savin; Trichina; Veratrum, Pot. Cyanide, etc.
  - **Corrosives.** — Acetic, Carbolic, Chromic, Lactic, Oxalic and Salicylic Acids; The concentrated mineral acids; Creosote; Corrosive Sublimate; Concentrated Lye; Potassium Chlorate; Potassium Nitrate; Potassium and Sodium Hydroxides and Carbonates; Quick Lime; Soluble Salts of Barium; Water of Ammonia, etc.
- **2. NEUROTICS.**
  - **Cerebral.**
    - **Narcotics.** — Alcohol; Apocynum; Belladonna; Chloral; Chloroform, Ether, etc. (Anesthetics); Carbonic Oxide; Carbon Dioxide; Opium, etc.
  - **Spinal.**
    - **Tetanics.** — Nux Vomica, Strychnine, Brucine; Ignatia; Thebaine, etc.
  - **Cerebro-Spinal.**
    - **Deliriants.** — Belladonna; Camphor; Cannabis Indica; Cocaine; Fishberries (Picrotoxin); Fungi; Hyoscyamus; Stramonium; Solanine, etc.
    - **Depressants.** — Arnica; Antipyrine; Phenacetin, and many other Phenol and Benzene derivatives; Colchicum; Cocaine; Hemlock; Lobelia; Tobacco (Nicotine).
    - **Asthenics.** — Aconite; Conium, Curare, Physostigma, Poke Root (Paralyzants); Digitalis; Fishberries (Picrotoxin); Gelsemium; Hydrocyanic Acid; Nitro-Benzol; Pink Root; Potassium Cyanide; Veratrum Viride; Animal and Insect Poisons, etc.

IRRITANTS.

An Irritant Poison is one which produces irritation or inflammation. When swallowed such poison produces an irritant effect upon the mucous lining of the alimentary canal, resulting in nausea, vomiting, purging, pain in the abdomen, cramps in the stomach and other parts of the body. Sometimes blood accompanies the vomited or purged matters.

The post-mortem changes are found to be more or less inflammation of the gastro-intestinal mucous membrane. Sometimes ulceration, perforation, and gangrene result.

A Corrosive Poison is a highly active Irritant Poison and causes local destruction of tissue. Such poison, when swallowed, usually produces nausea, vomiting and great local distress.

NEUROTICS.

A Neurotic Poison is one which acts chiefly upon the nervous system. Although highly diluted with water it continues to be poisonous. It is a true poison in the strict sense.

The symptoms are directed especially to the brain and spinal cord.

The chief symptoms are: Drowsiness, giddiness, headache, delirium, stupor, coma, and sometimes convulsions or paralysis.

Cerebral Neurotics affect chiefly the brain.

Spinal Neurotics affect chiefly the spinal cord.

Cerebro-Spinal Neurotics affect both brain and spinal cord.

Narcotics are those agents which produce stupor, complete or incomplete insensibility or loss of feeling. Of these the opium group produce sleep; the belladonna group produce illusions and delirium; the alcohol group produce exhilaration succeeded by sleep or delirium.

Anesthetics (General) are narcotics.

Tetanics are agents which act directly upon the spinal cord, producing such spasmodic and continuous contraction of muscles as result in stiffness or immobility of the parts to which they are attached. The tetanic spasm lasts from one to five minutes, followed by intervals of complete relaxation. Nux Vomica and its alkaloids belong to this class.

Deliriants are those agents which so act upon the brain as to disorder the mental faculties and produce confusion of will power or delirium (such as Belladonna, Hyoscyamus, Stramonium, Solanine, Cocaine, etc).

Depressants or Sedatives, are agents which retard or depress the physiological action of an organ (e. g., Tobacco, Nicotine, Lobelia, etc.).

Asthenics, or Exhaustives, are agents which produce exhaustion; they cause marked loss of vital or muscular power. A typical member of this class of poisons is Hydrocyanic Acid, which is one of the most deadly poisons. It is found in bitter almonds, wild cherry, peach and apricot kernels, the seeds of apples, and in the flowers and leaves of cherry laurel, peaches, etc. Physostigma and Digitalis exhaust heart.

Some **poisons** have the properties of both **a corrosive or irritant** and of a **neurotic poison** (e. g., Corrosive Sublimate, Arsenic, Carbolic Acid, etc.).

The following-named drugs act directly upon the **heart:** Aconite, Antimony salts, Chloral, Hydrocyanic Acid, Veratrum Viride, Digitalis, Sparteine, Strophanthus, etc. The first five decrease the number and force of the heart beats, the last three increase the force of the heart contractions.

Poisons which affect the heart cause death by sudden shock, collapse, or syncope.

Among **poisonous gases directly affecting the lungs** are: Carbonic-Acid Gas, Chlorine, Illuminating Gas, Muriatic-Acid fumes, Nitrous fumes, Sewer air, Sulpheretted Hydrogen, Sulphurous Oxide, etc. Neurotic symptoms are caused by poisonous gases, through the poisoning of the blood.

CHEMICAL CLASSIFICATION OF POISONS.

1. INORGANIC.	Volatile Non-Metallic Poisons.	Bromine; Chlorine; Iodine; Fluorine; Phosphorus; Arseniuretted, Phosphoretted, and Sulphuretted Hydrogen; etc.
	Metallic Poisons.	Antimony; Arsenic; Barium; Copper; Lead; Mercury; Silver; Tin; Zinc, etc.
	Mineral Acids.	Arsenic, Arsenous, Chromic, Hydrobromic, Hydrochloric, Nitric, Phosphoric and Sulphuric Acids.
	Mineral Alkalies.	Ammonium, Potassium, and Sodium, Hydroxides and Carbonates.
2. ORGANIC.	Volatile Organic Poisons.	Alcohol; Acetanilid; Aniline and its derivatives; Antipyrine; Phenacetin, etc. Benzene and its derivatives, including Carbolic Acid; Creosote; Carbon Monoxide; Coal Gas; Cyanogen; Picric Acid; Nitrobenzene; Chloral; Chloroform; Coniine; Ether; Hydrocyanic Acid; Nicotine; Sparteine, etc.
	Alkaloids.	Aconitine; Apomorphine; Atropine, Brucine; Cocaine; Codeine; Colchicine; Coniine; Curarine; Emetine; Hyoscyamine; Morphine; Narceine; Narcotine; Nicotine; Physostigmine; Pilocarpine; Ptomaines; Sparteine; Strychnine; Veratrine, etc.
	Animal Poisons.	Bee, Wasp, and Hornet stings, and bites of various other insects or of animals. Venom of various snakes, such as the Cobra, Copperhead, Rattlesnake, Mocassin, etc.
	Bacterial Poisons.	Food Poisons; Ptomains; Septic Poisons; Toxins.
	Glucosids.	Digitalin; Salicin; Santonin; Solanin; Strophanthin, etc.
	Organic Acids.	Acetic, Meconic, Oxalic, Salicylic, Tartaric, etc., Acids.

Tanner classifies poisons as:

Corrosives, Simple Irritants, Specific Irritants, and **Neurotics;** "the last group is, however, further subdivided."

He declares:

The group of *corrosives* should comprehend all poisons which by contact destroy the bodily textures, and so by chemical action alone occasion death.

These same substances, when diluted, may be incapable of destroying the tissues directly, but may do so by setting up inflammation; these, with certain others having like effects, would form the group of *simple irritants.* They kill by virtue of their secondary effects on the constitution. But some substances, like arsenic, are not only capable of inducing local inflammations, with their secondary effects, but are also possessed of certain specific and well-marked properties differing in each case. These are *specific irritants.*

Neurotics comprehend all poisons whose effects are referable to the nervous system, necessarily a most diverse group, which we are not yet in a position to minutely analyze. Some, however, act mainly on the *brain* (*opium*), some on the *spinal chord* (*strychnine*), some on *certain nerves* only (*curare*), or on the *vasomotor system of nerves* (*amyl nitrite*).

There was an old group of *septic* poisons. To this might still be referred certain noxious gases, such as hydrogen sulphide; or were it made to include all poisons acting directly on the blood, it would include the still more dangerous gas, carbon monoxide.

The following table exhibits these subdivisions, and some of the poisons contained in each:

Corrosives.	Strong Mineral Acids	Sulphuric.
		Nitric.
		Hydrochloric.
	Vegetable Acids....	Oxalic.
	Organic Derivatives	Carbolic Acid.
	Alkalies	Strong Alkalies.
		Alkaline Carbonates, **etc.**
Simple Irritants.....		The above diluted.
		Lime.
		Zinc.
		Silver, etc.

Specific Irritants....	Arsenic. Mercury. Antimony. Phosphorus. Iodine, etc.
Neurotics.....	Opium. Prussic Acid. Chloroform. Belladona. Aconite. Strychnin. Conium. Tobacco. Phenol, etc.

Corrosive Poisons are characterized by these three things: 1. *Immediate action.* 2. *Local effects,* such as destruction of *tissue* and *staining;* and in many cases by, 3. *Death* from *shock.*

Irritant Poisons give rise to—

1. *Pain in the stomach* and *bowels.* 2. *Faintness* and *sickness;* and 3. *Purging* with *straining.* 4. The evacuations are often tinged with blood. 5. The pulse is feeble and irregular; and 6. The skin is cold.

Many of the substances of this class, from irritating the tissues with which they come in contact, produce a severe burning sensation in the mouth and œsophagus, as well as in the stomach. The degree of local destructive action produced will of course vary in proportion to the amount of the vehicle with which the noxious agent may be diluted. Irritants cause death by inducing collapse or convulsions, or by exciting severe inflammation; or, in some cases, after a variable interval, by leading to stricture of the œsophagus. The diseases which most resemble the action of irritants are, malignant cholera, severe diarrhœa, colic, cholera morbus, gastritis, enteritis, rupture of the stomach or intestines, and obstruction of the bowels, mechanical or otherwise.

Neurotic Poisons.—The symptoms of certain diseases bear a resemblance to those caused by some of the poisons of the *neurotic* class. Thus, *belladonna* gives rise to *delirium* with special illusions or convulsions. Sometimes there is *tetanus,* as in *strychnine* poisoning; sometimes *coma* (*opium* and *carbolic acid*), or *syncope* (*digitalis*). Diseases of the brain and spinal chord, likely to be confounded with the effect of these poisons, are often very insidious in their progress, and hence may suddenly give rise to suspicious symptoms. The history,

mode of attack, etc., will generally negative any suspicion of poisoning.

The above facts show the necessity of extreme caution in diagnosing a poison from the symptoms exclusively.

As may be observed in the foregoing table, Tanner places under his first group, "Corrosives," first, the "strong" or "concentrated mineral acids," such as sulphuric acid (oil of vitriol), nitric acid (aqua fortis), hydrochloric acid (muriatic acid, spirit of salt), and such "mixed acids" as nitro-muriatic (aqua regia), and nitro-sulphuric (aqua reginæ), and also sulphate of indigo; second, the "corrosive vegetable acids," including oxalic acid (the so-called acid of sugar), acid potassium oxalate (salt of sorrel, essential salt of lemons), acetic acid, and tartaric acid; third, the "corrosive organic derivatives," under which he places creosote, and carbolic acid (phenol), and in this connection he also classes the "derivatives from coal tar," such as antipyrin, antifebrin (acetanilid), phenacetin, salicylic acid, and salol; fourth, the "caustic alkalies and carbonates" under which he places potash (potassium hydroxid), potassium carbonate (pearl ash), caustic soda (sodium hydroxid, sodium carbonate (washing crystal), ammonia (ammonium hydroxid), and ammonium carbonate.

Under his second group, "Simple Irritants," he places, 1st. **Salts of potassium, etc.:** Potassium nitrate (nitre, saltpetre, sal prunelle), potassium sulphate, potassium bitartrate (cream of tartar, argols), liver of sulphur (an impure potassium sulphid), and lime; 2d. **Zinc, silver, etc.,** Zinc sulphate (white vitriol), zinc chlorid, silver nitrate (lunar caustic), tin chlorides, bismuth subnitrate, potassium bichromate, iron sulphate (green vitriol, copperas), and ferric chlorid; 3d. Such "simple vegetable irritants" as "aloes, colocynth, jalap, gamboge, scammony, elaterium, croton oil, castor-oil seeds, various specifics of arum, euphorbium, bryony, mezereon, physic nut, and others less commonly

known;" and also such **"simple animal irritants"** as poisonous fish, and poisonous meat, and such foods as milk and cheese which have undergone such changes as make them poisonous; 4th. Such **"irritant gases"** as chlorin, sulphurous acid, nitric oxid, hydrochloric acid gas, and ammonium hydroxid.

Under his third group, **"Specific Irritants,"** he places, 1st. Such **"specific mineral irritants"** as iodin and potassium iodid, bromin and potassium bromid; also phosphorus, arsenous acid (arsenic, white arsenic), hydrogen arsenid, copper arsenite (Scheele's, Brunswick, or mineral green), antimony chlorid (terchlorid or butter of antimony), tartar emetic (tartarized antimony, potassio-antimony tartrate), mercury and its compounds, such as corrosive sublimate, calomel, the red oxid (red precipitate), the red sulphid (cinnabar or vermilion), the cyanid, the nitrates, and the subsulphate (turpeth mineral); also lead acetate (sugar of lead), lead subacetate (Goulard's extract), lead carbonate (white lead), copper sulphate (blue vitriol or bluestone), copper subacetate (verdigris), barium chlorid, barium nitrate, and barium acetate. 2d. Such **"specific vegetable irritants"** as laburnum, "œnanthe crocata, phellandrinum aquaticum, æthusa, cynapium, etc." Also black hellebore. 3d. Such **"specific animal irritants"** as cantharides (Spanish flies), etc.

His fourth group, **Neurotics,** he divides into **"Narcotics** (neurotics acting on the brain and producing sleep)," in which he includes opium and its various preparations and alkaloids; **"Anesthetics** (neurotics acting on the brain and producing loss of sensation)," in which he includes chloroform, chloral, methylene dichlorid, ether, and nitrous oxid; **"Inebriants** (neurotics acting on the brain and producing intoxication)," in which he includes alcohol, nitrobenzene, anilin, cocculus indicus, darnel seeds (lolium temulentum), camphor and fungi; **"Deliriants** (neurotics acting on the brain and producing delirium),"

in which he includes belladonna and its alkaloid, stramonium (thorn apple), dhatoora (seeds of datura alba), henbane and its alkaloids, nightshade with its active principle solanin, cocain and eucain; "**Convulsants** (neurotics producing convulsions)," in which he includes nux vomica, strychnin and brucin; "**Paralysants** (neurotics producing paralysis of the motor nerves)," in which he includes calabar bean and its active principle eserin, conium (common or spotted hemlock) and its alkaloid conin; "**Hyposthenisants or Syncopants** (neurotics producing death by syncope)," in which he includes aconite and its alkaloid aconitin, hydrogen cyanid (prussic acid), potassium cyanid, also gelsemium and its alkaloid gelsemin, etc.; "**Depressants** (neurotics producing marked depression of the heart's action)," in which he includes digitalis and its active principle digitalin, tobacco and its alkaloid nicotin, lobelia, colchicin, white hellebore and green hellebore and veratrine; "**Asphyxiants** (noxious gases, producing neurotic symptoms by means of blood poisoning)," in which he includes carbon monoxid, carbon dioxid (carbonic acid gas), hydrogen sulphid (sulphuretted hydrogen), and the so-called "coal gas;" "**Abortives** (substances producing abortion)," in which he includes ergot of rye, savin and its oil, oil of tansy, the yew, and extract of cotton root.

To the foregoing, Taylor adds the following in the appendix of his book:

I. "**Bites of venomous reptiles,**" with chief reference to the bites of such serpents as the cobra of India, the adder (or common viper) of England, the brown and black snake of Australia, also the tiger snake, the rattlesnake, the copperhead, etc.

II. "**Bites of rabid animals,**" such as mad dogs, etc.

III. "**The stings of bees, etc.,**" including those of bees, wasps, hornets, scorpion, etc.; also the bites of ants and other insects.

KOBERT'S CLASSIFICATION OF POISONS.

I. Poisons Which Cause Coarse Anatomical Changes of the Organs.

A. Those which especially irritate the part to which they are applied.

1. Acids.
2. Caustic alkalies.
3. Caustic salts, especially those of the heavy metals.
4. Locally irritating organic substances, which neither can be classified as corrosive acids nor alkalies, nor as corrosive salts. Such are: Cantharidine, phrynine, and others in the animal kingdom, croton oil and savin in the vegetable kingdom; locally irritating colors, such as the aniline dyes.
5. Gases and vapors which cause local irritation when breathed, such as ammonia, chlorine, iodine, bromine, and sulphur dioxide.

B. Those which have but little effect locally, but change anatomically other parts of the body, such as lead, phosphorus and others.

II. Blood Poisons.

1. Blood poisons interfering with the circulation in a purely physical manner, such as peroxide of hydrogen, ricine, abrine.
2. Poisons which have the property of dissolving the red blood corpuscle, such as the saponins.
3. Poisons which, with or without primary solution of the red blood corpuscles, produce in the blood methæmoglobin, such as potassic chlorate, hydrazine, nitrobenzene, aniline, picric acid, carbon disulphide.
4. Poisons having a peculiar action on the coloring matter of the blood, or on its decomposition products, such as hydric sulphide, hydric cyanide, and the cyanides and carbon monoxide.

III. Poisons Which Kill Without the Production of Coarse Anatomical Change.

1. Poisons affecting the cerebro-spinal system, such as chloroform, ether, nitrous oxide, alcohol, chloral, cocaine, atropine, morphine, nicotine, coniine, aconitine, strychnine, curarine, and others.
2. Heart poisons, such as digitalis, helleborin, muscarine.

IV. Poisonous Products of Tissue Change.

1. Poisonous albumin.
2. Poisons developed in food.
3. Auto-poisoning. e.g., uræmia, glycosuria, oxaluria.
4. The more important products of tissue change, such as fatty acids, oxyacids, amido-fatty acids, amines, diamines, and ptomaines.

CLASSIFICATION OF POISONS ACCORDING TO THE MOST PROMINENT SYMPTOMS.—(Blyth.)

A. Poisons Causing Death Immediately, or in a Few Minutes.

There are but few poisons which destroy life in a few minutes. Omitting the strong mineral acids, carbon monoxide, carbon dioxide, with the irrespirable gases, prussic acid, the cyanides, oxalic acid and occasionally strychnine are the chief poisons coming under this head.

B. Irritant Poisons (Symptoms Mainly Pain, Vomiting and Purging.)

Arsenic, antimony, phosphorus, cantharides, savin, ergot, digitalis, colchicum, zinc, mercury, lead, copper, silver, iron, baryta, chrome, yew, laburnum, and putrid animal substances.

C. Irritant and Narcotic Poisons (Symptoms Those of an Irritant Nature, With the Addition of More or Less Pronounced Cerebral Indications.)

To this class more especially belong oxalic acid and the oxalates, with several poisons belonging to the purely narcotic class, but which produce occasionally irritant effects.

D. Poisons More Especially Affecting the Nervous System.

1. Narcotics (chief symptom insensibility, which may be preceded by more or less cerebral excitement), opium, chloral, chloroform.

2. Deliriants (delirium for the most part a prominent symptom), belladonna, hyoscyamus, stramonium, with others of the solanaceæ, to which may be added poisonous fungi, Indian hemp, lolium temulentum, ænanthe, crocata, and camphor.

3. Convulsives. Almost every poison has been known to produce convulsive effects, but the only true convulsive poisons are the alkaloids of the strychnos class.

4. Complex Nervous Phenomena. Aconite, digitalis, hemlock, calabar bean, tobacco, lobelia inflata, and curara.

Analyst Blyth, of England, states his views, regarding the best classification of poisons, as follows:

"I have preferred an arrangement which, as far as possible, follows the order in which a chemical expert would search for an unknown poison, hence an arrangement partly chemical and partly symptomatic. First, the chief gases which figure in the mortality statistics are treated, and then follow in order other poisons."

A chemist given a liquid to examine would naturally test first its reaction, and, if strongly alkaline or strongly acid, would at once direct his attention to the mineral acids or to the alkalies. In other cases he would proceed to separate volatile matters from those that were fixed, lest substances such as prussic acid, chloroform, alcohol, and phosphorus be dissipated or destroyed by his subsequent operations.

Distillation over, the alkaloids, glucosides, and their allies would next be naturally sought, since they can be extracted by alcoholic and ethereal solvents in such a manner as in no way to interfere with an after-search for metals.

The metals are last in the list, because by suitable treatment, after all organic substances are destroyed, either by actual fire or powerful chemical agencies, even the volatile metals may be recovered. The metals are arranged very nearly in the same order as that in which they would be separated from a solution, viz., according to their behavior to hydric and ammoniac sulphides.

There are a few poisons, of course, such as the oxalates of the alkalies, which might be overlooked, unless sought for specially, but it is hoped that this is no valid objection to the arrangement suggested, which, in greater detail, is as follows:

A. Poisonous Gases.

Carbon monoxide; Chlorine; Hydric sulphide.

B. Acids and Alkalies.

1. Sulphuric acid; 2. Hydrochloric acid; 3. Nitric acid; 4. Potash; 5. Soda; 6. Ammonia; 7. Neutral sodium, potassium, and ammonium salts.

In nearly all cases of death from any of the above, the analyst, from the symptoms observed during life, from the surrounding circumstances, and from the pathological appearances and evident chemical reactions of the fluids submitted, is put at once on the right track, and has no difficulty in obtaining decided results.

C. Poisonous Substances Capable of Being Separated by Distillation From Either Neutral or Acid Liquids.

1. Hydrocarbons; 2. Camphor; 3. Alcohols; 4. Amyi-nitrite; 5. Chloroform and other anæsthetics; 6. Carbon di-sulphide; 7. Carbolic acid; 8. Nitro-benzene; 9. Prussic acid; 10. Phosphorus.

The volatile alkaloids, which may also be readily distilled by strongly alkalizing the fluid, because they admit of a rather different mode of treatment, are not included in this class.

D. Alkaloids and Poisonous Vegetables Principles Separated for the Most Part by Alcoholic Solvents.

Division I.—Vegetable Alkaloids.

1. Liquid volatile, alkaloids, alkaloids of hemlock, nicotine, piturie, sparteine, aniline; 2. The opium group of alkaloids; 3. The strychnine or tetanic group of alkaloids, strychnine, brucine, igasurine; 4. The aconite group of alkaloids; 5. The mydriatic group of alkaloids, atropine, hyoscyamine, solanin, cytisine; 6. The alkaloids of the veratrines; 7. Physostigmine; 8. Pilocarpine; 9. Taxine; 10. Curarine; 11. Colchicin; 12. Muscarine and the active principles of certain fungi.

There would, perhaps, have been an advantage in arranging several of the individual members somewhat differently, e.g., a group might be made of poisons which, like pilocarpine and muscarine, are antagonistic to atropine; and another group suggests itself, the physiological action of which is the opposite of the strychnos class. Solanin (although classed as a mydriatic and put near to atropine), has much of the nature of a glucoside, and the same may be said of colchicin, so that, if the classification were made solely on chemical grounds, solanin would have followed colchicin, and thus have marked the transition from the alkaloids to the glucosides.

Division II.—Glucosides.

1. The digitalis group; 2. Other poisonous glucosides acting on the heart; 3. Saponin.

The glucosides, when fairly pure, are easily recognized; they are destitute of nitrogen, neutral in reaction, and split up into sugar and other compounds when submitted to the action of saponifying agents, such as boiling with dilute mineral acids

Division III.—Certain Poisonous Anhydrides of the Organic Acids.

1. Santonin; 2. Mezerein.

It is probable that this class will in a few years be extended, for several other organic anitrogenous poisons exist, which, when better known, will most likely prove to be anhydrides.

Division IV.—Various Vegetable Poisonous Principles, Not Admitting of Classification Under the Previous Three Divisions.

Ergot, picrotoxin, the poison of illicium religiosum, cicutoxin, æthusa cynapium, œnanthe crocata, croton oil, savin oil, the toxalbumins of castor oil, and abrus.

The above division groups together various miscellaneous toxic principles, none of which can at present be satisfactorily classified.

E. Poisons Derived From Living or Dead Animal Substances.

Division I.—Poisons Secreted by the Living.

1. Poisonous amphibia; 2. Poison of the scorpion; 3. Poisonous fish; 4. Poisonous insects, spiders, wasps, bees, beetles, etc.; 5. Snake poison.

Division II.—Poisons Formed in Dead Animal Matters.

1. Ptomaines; 2. Poisoning by putrid or changed foods—sausage poisoning.

F. The Oxalic Acid Group.

G. Inorganic Poisons.

Division I.—Precipitated from a hydrochloric acid solution by hydric sulphide—precipitate, yellow or orange.

Arsenic, antimony, cadmium.

Division II.—Precipitated by hydric sulphide in hydrochloric acid solution—black. Lead, copper, bismuth, silver, mercury.

Division III.—Precipitated from a neutral solution by hydric sulphide. Zinc, nickel, cobalt.

Division IV.—Precipitated by ammonia sulphide.

Iron, chromium, thallium, aluminium.

Division V.—Alkaline earths. Barium.

Victor C. Vaughan classifies poisons into:

(1) Mineral.—(*a*) metallic poisons, (*b*) acids, (*c*) alkalies and (*d*) inorganic gases.

(2) Vegetable.—(*a*) alkaloids, (*b*) organic acids, (*c*) poi-

sonous glucosids, and (*d*) poisonous vegetable proteins.

(3) Synthetic.—

(4) Animal.—The venom of serpents, the secretion of certain fishes, the poisonous leukomains, etc.

(5) Bacterial.—As "the toxins of diphtheria, tetanus and certain other infectious diseases. The bacterial poisons may be divided into: (*a*) basic poisonous products, or the ptomains, (*b*) the so-called bacterial toxins, and (*c*) the protein poisons."

R. A. Witthaus classifies poisons in two ways: one an analytical classification, somewhat different from most authors; the other a natural classification based chiefly upon the origin. His analytical one is:

"I. Gaseous Poisons: Carbon monoxid, hydrogen sulfid, sulfur dioxid.

II. Volatile Poisons, separable from mixtures by mere distillation with or without vapor of water and from acid neutral or alkaline liquids: Alcohol, chloroform, hydrocyanic acid, ammonia and its derivatives, phosphorus, etc.

III. Acids, Alkalies, and Salts: Mineral poisons and corrosives, which are best separated by extraction with water. Mineral acids and alkalies and certain soluble metallic salts.

IV. Organic Poisons: Substances which do not withstand the action of powerful reagents and which are extracted from the mixtures in which they exist by neutral solvents or by dilute acids, either applied directly or in agitation methods with immiscible solvents—vegetable acids, glucosids, alkaloids, and bitter principles, and animal poisons.

V. Mineral poisons: Substances of sufficient stability to permit of their separation by the decomposition and removal of the organic substances with which they may be mixed, followed by the usual methods of mineral analysis, somewhat modified to meet the requirements of the case."

His other natural group classification is:

"I. Corrosives: Substances which act chemically upon the tissues with which they are brought into immediate contact—Mineral acids, alkalies, halogens, etc.

II. Poisons: Substances which act after entrance into the circulation, followed by solution in the blood or chemical action upon the blood itself.

A. Mineral Poisons: Arsenic, antimony, phosphorus, the salts of copper, lead, mercury, etc.

B. Vegetable Poisons: Vegetable acids, alkaloids, bitter principles, glucosids, etc.

C. Animal Poisons: Leukomains, ptomains, toxins, toxalbumins.

D. Synthetic Poisons: Chloroform, alcohol, chloral, phenol, antipyrin. etc."

PROMPT TREATMENT FOR POISONING.

When symptoms and circumstances indicate that a poison has been taken, the following course should be pursued:

1. **If there is a known chemical antidote and it is at hand, use it at once** (either alone or in conjunction with an evacuant), **and in sufficient quantity to thoroughly neutralize the poison.**

If the chemical antidote is not known or not at hand and it is believed **no corrosive poison strong enough to produce a prohibitive caustic effect, has been taken, or the patient is not in a condition of extreme exhaustion, at once evacuate the stomach** (i. e., resort to 2). **Or where evacuation is impossible or improper, promptly employ such mechanical antidotes as will coat the walls of the stomach, etc., mechanically suspend the poison, or remove the latter by catharsis.**

2. **In absence of prohibitive caustic action of poison, inflammation, or extreme exhaustion, evacuate and wash out stomach** by means of stomach-tube, stomach pump, or emetics, and warm water. **If a chemical antidote is now for the first time convenient, employ it. Demulcents should usually be employed after evacuation of stomach.**

3. **Use the proper antagonist** to counteract the effects of any of the poison which may have been absorbed. (If the patient is not treated promptly after the poisoning, it may be advisable to at once resort to the physiological antidote (antagonist).

Also encourage the natural processes of removal (i. e., urination, perspiration, etc.).

4. **Employ the proper antagonistic measures to stimulate** flagging organic functions.

ANTIDOTES.

Mechanical and True Antidotes directly affect a poison either mechanically or chemically, or both, so as to remove it from the body, alter its character before absorption, or hinder absorption, and thus pre-

vent its poisonous action upon the system. They act in the respiratory passages or alimentary canal and may be employed for vegetable, animal or mineral poisons.

Mechanical Antidotes include: use of stomach tube or pump; employment of Emetics, Cathartics, Demulcents, Injections, Ligatures, Poultices, Washes, etc.

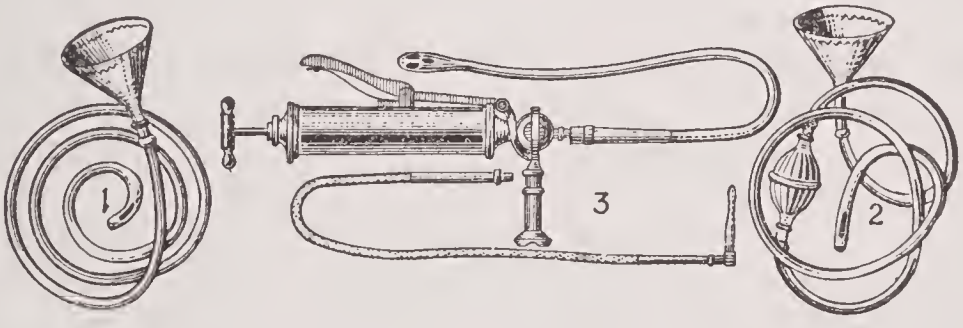
Chemical Antidotes include: Oils, Soap, Milk, Acids, Albumin, Alkalies, Charcoal, Carbonates, Hydrates, Sulphates, Iodine, Potassium, Permanganate, Sodium Chloride, Starch, Tannic Acid, Turpentine, preparations of Iron, etc.

Physiological Antidotes are antagonists and act directly upon the functions, counteracting effects.

MECHANICAL ANTIDOTES.

THE STOMACH TUBE AND THE STOMACH PUMP.

When active measures are to be employed to evacuate the stomach, this is most readily accomplished by means of the stomach tube (Figs. 1 and 2), the stomach pump (Fig. 3), or by emetics.



The **stomach tube** (with or without an exhaust bulb) is introduced into the stomach by forcibly keeping the poisoned person's mouth open, by means of a gag, or other substance, and passing the tube down; well to use the finger to guide it in the mouth. Avoid passing tube into windpipe in front of gullet. If spasm of gullet interferes with passage, apply cocaine ointment to tube. Sometimes necessary to introduce tube through nose instead of mouth. Tepid water may be introduced into the stomach through the funnel and tube, and by lowering the tube and

turning the funnel down, the stomach may be more or less emptied of fluid and poison by siphonage, or by using the exhaust bulb.

Washing out process should be repeated until all poison apparently has been removed from stomach.

Washing often advisable even after free vomiting as some poisons adhere to stomach walls.

The proper antidote or emetic may frequently advantageously be dissolved in the water used.

The stomach pump is a harsher, but sometimes more effective apparatus than the stomach tube.

Although **the stomach pump and stomach tube** are so efficient and do not weaken the person as emetics do, yet neither should be used when there is severe **corrosion** of the stomach or esophagus, lest perforation result. Both may be difficult to use or **inefficient** when the poison is in a solid form (as meat, fish, etc.).

EMETICS.

Emetics are agents which produce vomiting. They may conveniently be divided into two classes: **Local Emetics, and Systemic or General Emetics.**

Local Emetics produce their effects by their irritation of the terminal nerve filaments of the pharynx, esophagus or stomach. The emetic action results from a **reflex** stimulation of the vomiting center in the medulla oblongata.

Systemic or General Emetics produce their effects through the medium of the circulation. The emetic action is due to a **direct** stimulation and irritation of the vomiting center in the medulla.

LOCAL EMETICS.

Alum—a tablespoonful in water, syrup or honey. (Unreliable.)

Ammonium Carbonate—30 grs. or more in water.

Copper Sulphate—10 grains in water in one dose; or 3 to 6 grains every 15 minutes until acts.

Mustard—2 to 4 teaspoonfuls in a cupful of warm water, stirred to a cream. (Good and stimulating).

Olive Oil, Melted Fats, Soapsuds, Vaseline, etc.—freely.

(**Fats and Oils** and substances containing them are **contra-indicated** in poisoning by Cantharides, Carbolic Acid, Copper Salts, or Phosphorus, because fats and oils facilitate the absorption of these poisons.)

Quassia and other vegetable bitters—in strong infusion as a drink.

Sodium Chloride—(common salt) 2 teaspoonfuls or more in a cupful of water. (Frequently effective).

(**Sodium Chloride is contra-indicated** in poisoning by Tartar Emetic, or Mercuric Chloride. Also do not give it after Zinc Sulphate.)

Tepid Water—in quantity freely, (4 to 8 glasses).

Tickling Throat with feather or finger. (Good).

Yellow Mercuric Sulphate (Turpeth Mineral)—2 to 5 grains. (Unsafe unless it vomits.)

Zinc Sulphate—10 to 30 grains in a wineglassful of water; repeat if necessary. Or 30 grains in 2 ounces of water, giving a tablespoonful every 10 to 20 minutes until effective. Children 5 grains. (This is the best emetic.) It is prompt and safe, but do not give it after giving salt and water.

SYSTEMIC OR GENERAL EMETICS:

Antimony, Wine of—An ounce or more in water.

Apomorphine Hydrochlorate—gr. 1/16 to ⅛, hypodermically when the use of emetics by the mouth is prevented by narcosis or otherwise. By giving Strychnine with it lessen depressive effects.

Emetine—gr. 1/12 to ⅓.

Ipecac, Fluid Extract of—¼ to 1 teaspoonful.

Ipecacuanha, Pulverized—15 to 30 grains or more in water, repeated in 10 or 15 minutes. Does not irritate the mucous membrane of the stomach.

Ipecac, Syrup of—1 to 4 teaspoonfuls, or a teaspoonful every 10 minutes until vomiting is produced.

Ipecac, Wine of—1 or 2 tablespoonsfuls in water. (Slow and unsatisfactory).

Squill, Syrup of—A teaspoonful.

Squill, Compound Syrup of—¼ to ½ teaspoonful.
Tartar Emetic—1 to 3 grains. Children ½ grain. (Slow and depressing).

In poisoning it is better to use **almost any emetic at once** than to lose valuable time getting just the right emetic. Some persons vomit very readily, others with the greatest of difficulty. Some vomit from a drink of tepid, greasy or dirty water, with or without the introduction of the fingers into the throat. In narcotic poisoning it is frequently very difficult to induce vomiting. It is sometimes desirable to give a combined emetic. May begin with a tablespoonful of mustard in a small tumblerful of water and follow soon after with Zinc Sulphate 30 grains, and powdered Ipecacuanha 30 grains, mixed in water.

The **action of an emetic is aided by** giving plenty of **tepid water. Emetics** are **contra-indicated** when there is a severe **corrosion** of the **alimentary canal or an abdominal inflammation.**

CATHARTICS.

Cathartics are agents which produce intestinal evacuations. They include Castor Oil, Croton Oil, Magnesium Sulphate, Senna, Sodium Phosphate, etc. They are generally used after a chemical antidote to remove from the intestinal canal the compounds formed by such antidote.

Castor Oil protects the mucous membrane and interferes with absorption, but should not be used in poisoning by Cantharides, Carbolic Acid, Copper Salts or Phosphorus, absorption of which it seems to aid.

Croton Oil is rapid and active in a 1 to 5 minim dose in bread pill.

Magnesium Sulphate is useful in doses of ½ to 4 ounces, in water. Sodium Sulphate in same doses.

Such cathartics as **Senna** and **Gamboge** are often the best ones for narcotic poisoning.

DEMULCENTS.

Demulcents are substances which **soothe** and **protect** the parts to which they are applied. They include Almond, Olive, and other bland Oils, Acacia, Barley, Cetraria, Elm, Figs, Flaxseed, Gelatin, Glycerine, Honey, Isinglass, Liquorice Root, Marshmallow Root, Starch, Tragacanth, and White of Egg, each with or without water.

CHEMICAL ANTIDOTES.

OILS, ALBUMIN, TANNIN, ETC.

Oils and Fats (almond, cotton seed, linseed and olive oils, melted butter, lard, etc.). Oils and fats are useful against the corrosive acids and alkalies, metallic oxides and salts; they are, however, considered to be contra-indicated in poisoning by Cantharis, Carbolic Acid, Creosote, Copper Salts and Phosphorus, because they encourage the absorption of these poisons. Oils and fats unite with the caustic alkalies to form soaps; thus liberating glycerine. As antidotes to the metallic salts they are not as good as albumin. As antidotes to the alkalies they are inferior to acids, owing to their slow action.

Soap (Castile Soap, etc.). Castile soap dissolved in four times its bulk of hot water to form **"suds,"** and administered by the cupful, is an excellent antidote for corrosive acids and metallic salts, particularly Corrosive Sublimate, Potassium Bichromate, and Tin and Zinc Salts; but Albumin is better for these last two. Soap is better than caustic alkalies for acids, because it has no corrosive action. It should not be used as an antidote to alkalies.

Albumin.—An excellent **Chemical Antidote, forming Compounds,** more or less inert with most of the corrosive alkalies, metallic salts, mineral acids. Anilin, Bromine, Chlorine, Creosote, Iodine, and with alcoholic solutions of most of the alkaloids.

It is particularly valuable as an antidote to inorganic poisons and a good application for the bites and stings of insects.

Albumin should be well diluted when used (the white of one egg, or sometimes the whites of four eggs, to one quart of tepid water). It is important to follow it first by an emetic and then by a cathartic inasmuch as many of its compounds are soluble in an excess of albumin, or in acid or alkaline solutions.

Milk.—The antidotal action of milk is similar to that of albumin and due to its albumin, casein and free alkali. Milk is a good substitute for albumin, and especially suitable for metallic salts, corrosive acids and alkalies (particularly Ammonia), and the alkaline earths. Owing to the fat in milk it is to be avoided when fatty antidotes are contra-indicated, except in poisoning by Phenol.

White of egg and milk together are good antidotes to iodic preparations and Phenol.

Acids, Inorganic.—Diluted Sulphuric Acid ½ drachm mixed in water is used as an antidote to the soluble salts of Barium and Lead, forming insoluble Sulphates. It is also used to prevent absorption of lead in Lead Poisoning.

Acids, Organic.—Acetic Acid (such as vinegar), Citric Acid (such as lemon, lime, or orange juice), and Tartaric Acid in water are used as antidotes to the alkalies and the alkaline carbonates.

Ammonia (diluted), by inhalation, is an excellent antidote to the vapors of corrosive acids and Nitrobenzol, Formaldehyde, and to Bromine, Chlorine, and Hydrocyanic Acid, also to relieve the stupor of alcoholic poisoning.

Ammonium Carbonate, by hypodermic injection (in 5 grain doses in aqueous solution), in the vicinity of a wound through which arrow poison has entered the body, is very efficient against such poison. Locally applied it is also very efficient in the bites of venomous serpents and insects. Taken internally it is capable of promptly suspending a high degree of alcoholism. Calcium Hydrate and

Carbonate (Lime Water, powdered chalk mixed with water (Mistura Cretae), egg shells, pulverized oyster shells, etc.) may advantageously be employed as an antidote to neutralize Oxalic Acid and the Acid Oxalates and convert them into insoluble Calcium Oxalate.

Charcoal (powdered) has an antidotal action against many alkaloids, metallic salts and Phosphorus, and apparently against Opium, Nux Vomica, and Aconite, delaying the poisonous action and effects of all of them. It may either absorb the poison or protect the walls of the stomach. It absorbs gases but does not form a fixed compound with any mineral or vegetable poison. **Fresh Animal Charcoal** is preferable to wood charcoal, and is used in **tablespoonful doses**, frequently repeated. It should be followed by an emetic or the stomach-tube.

Alcohol.—Concentrated alcohol has a dehydrating effect upon animal tissues with which it comes in contact. It is considered a valuable antidote in Carbolic Acid poisoning. Four ounces of Alcohol in as much or more water may be administered repeatedly, each time removing it by means of the stomach-tube; or Apomorphine may be given hypodermically, to empty the stomach, and to prevent acute alcoholism. **Magnesium Sulphate** or **Sodium Sulphate** in 1 to 2 ounce doses in water should then be given. A half pint or more of brandy or whiskey may be substituted for the alcohol and water. Although alcohol is so applicable to serpent poisoning it is not a direct antidote to it. As a heart stimulant in certain kinds of poisoning alcohol is invaluable, but should be avoided in case of injury to the brain, or excessive cardiac action.

Ether has been extensively employed as a stimulant, in the collapse of Opium and Chloral poisoning, in fifteen minim doses hypodermically injected (not deeply) and repeated as often as necessary.

Chlorine, employed externally in the form of Chlorine Water, Labarraques' Solution (a solution of Sodium Hypochlorite), or Javelle Water (a solution of Potassium Hypochlorite), is a good antidotal

wash for snake-bite, insect stings, and other poisoned wounds; it may be employed internally when well diluted, as an antidote to alkaloids and other vegetable and animal poisons; may also be inhaled as a spray, as an antidote against coal gas (Carbonic Oxide), Ammonia, Phosphoretted and Sulphuretted Hydrogen, and Hydrocyanic Acid. Sodium Hyposulphite is the antidote to the Chlorine and Iodine solutions.

Copper Sulphate, as an emetic, may be given in doses of three or four grains or more in water, until vomiting occurs. It is more irritating than Zinc Sulphate and hence acts more readily. If it fails to act it must be promptly removed (by stomach tube or otherwise) or it will cause local inflammation. In Phosphorus poisoning Copper Sulphate is of special application, as it is supposed to coat the particles of Phosphorus, primarily with a layer of Copper Phosphide, secondarily with Copper itself, thus preventing the solution of the Phosphorus particles in the stomach fluids.

Gelatin is an antidote to the Alums, Bromine, and Iodine. The chief objection to it is that it has to be broken up, soaked in water half an hour and reduced to a fine consistency. It has a soothing effect upon irritated mucous membranes.

Gluten is sometimes employed as an antidote to Corrosive Sublimate, but it is not readily procured nor as efficient as Albumin.

Gum Arabic in the form of mucilage is chiefly serviceable as a protective in the alimentary canal, against irritant or corrosive poisons. It is also used as an antidote to the Bismuth salts.

Iodine, well diluted, is sometimes given as an antidote to the alkaloids and their salts, to other vegetable poisons and to snake venom. It is one of the most reliable applications to wounds made by venomous serpents and rabid animals. All Iodine compounds are more or less soluble and poisonous and must on this account be promptly removed from

the system. The following antidote (Bouchardat's) for vegetable poisons is considered very good:

Iodine, 3 grains; Potassium Iodine, 30 grains; Distilled Water, 11 ounces; mix. Dose, 1½ to 3 ounces, frequently repeated.

Iron—Ferri Oxidum Hydratum (Hydrated Ferric Oxide), also Ferri Oxidum Hydratum cum Magnesia (the Official Arsenic Antidote), Ferrum Oxidatum Saccharatum, Dialyzed Iron and the basic Ferric Acetate are all used as antidotes to Arsenic poisoning to form Ferric or Magnesium Arsenite.

The union of Iron with the salts of Arsenic is limited, even though the Iron be in great excess. A better action is obtained if a small amount of Ammonia or other caustic alkali is added to it, or if the basic Ferric Acetate is mixed with it.

Ferri Oxidum Hydratum — Ferric Hydroxide (Hydrate), Hydrated Oxide of Iron—is a chemical antidote for **Arsenous Acid** and the **Arsenites** with which it combines to form a ferric arsenite and also acts locally as a protector of the mucous membrane of the alimentary canal. It is a reddish-brown, smooth magma, entirely soluble, without effervescence, in Acetic Acid. When required for use it should be freshly prepared by mixing together Solution of Ferric Sulphate 100 parts, Ammonia Water 110 parts, and water enough to make 250 parts. The solution of Ferric Sulphate and the Ammonia Water should be kept on hand in separate bottles all ready for mixing, 200 Cc. of the first and 220 Cc. of the latter. When mixed together in these proportions a precipitate forms which may be washed by pressing it in a wet muslin strainer until no more liquid passes, then suspending it in 250 parts of water. The dose is a teaspoonful in water, repeated every 5 or 10 minutes.*

*Although such is in accordance with the U. S. P. direction, it would seem desirable and more convenient for the solutions to be made of such strength that a mixture of equal volumes of them would cause them to neutralize each other.

Ferri Oxidum Hydratum cum Magnesia (Ferric Hydrate with Magnesia, Arsenic Antidote), dose, a teaspoonful in water, repeated every 5 or 10 minutes, is a more convenient and better arsenic antidote than the preceding preparation. In this the excess of the alkaline precipitant is not an irritant and is itself an antidote to Arsenic.

The following solutions (1 and 2) should be kept on hand:

No. 1. Solution of Ferric Sulphate 50 cc., in water 100 cc.

No. 2. Magnesia (Magnesium Oxide), 10 grammes, rubbed up with water 750 cc., in a bottle of 1000 cc. capacity. When the preparation is required, shake No. 2 to a homogeneous magma and add it gradually to No. 1, after which shake them together to a uniform smooth mixture. This should be given in large doses of an ounce or more, and frequently repeated.

Sesqui-Oxide of Iron (freshly prepared), made by precipitating Tincture of Perchloride of Iron with Sodium Carbonate and filtering through a cloth, may be given as an antidote to Arsenic. It should be freely administered in hot water.

Dialyzed Iron may be given in ounce doses or less, frequently repeated, for the same purpose.

Magnesia (Calcined Magnesia; Magnesium Oxide; Mg. O.). Magnesia mixed with twenty-five times its weight of warm water gelatinizes, becoming suited to antidotal use. It may be given in 1½ to 2 ounce doses of such mixture, frequently at first, then after a few doses less often. An excess merely acts as a cathartic. Magnesium Oxide is better than Magnesium Carbonate as an antidote to the acids, because of the production of Carbon Dioxide, which might injure the stomach by its expansive action. **Magnesia is one of the best antidotes against the acids and the acid salts, including even Oxalic Acid, and the Acid Oxalates, if the Calcium antidotes are not at hand. It is**

also a good antidote in poisoning by Arsenic, Phosphorus, Mercury, Corrosive Sublimate, and other metallic salts. With most of these it forms insoluble compounds; with the mineral acids its value is chiefly due to its power to neutralize them; by alkalinizing the stomach contents it hinders the absorption of alkaloids.

Magnesium Sulphate (Epsom Salt), and **Sodium Sulphate** (Glauber Salt) are soluble Sulphates and especially efficient in poisoning by Carbolic Acid or by the salts of Barium or of Lead. With the last two they form insoluble Sulphates. With Carbolic Acid they apparently do not form a Sulpho-carbolate of Magnesium or of Sodium in the stomach, but encourage elimination of the Carbolic Acid after it has been absorbed. Sodium Sulphate seems to be superior to Magnesium Sulphate as an eliminative in poisoning by Carbolic Acid. These salts should be administered in ½ to 2 ounce (or 1 to 2 tablespoonful) doses in water, repeated at frequent intervals, and a pint or more of a solution one-fourth that strength should be left in the stomach, after repeated lavage, to be absorbed and wholly neutralize the absorbed Carbolic Acid. Carbolic Acid appears in the urine as Potass-Phenyl-Sulphate, not as a Sulpho-Carbolate, and when no soluble sulphate has been given.

Potassium Ferrocyanide is efficient as an antidote to the Copper salts, and may be given in 5 to 30 grain doses in water to form the brown, insoluble cupric ferrocyanide. Albumin, however, is just as good and as a rule more convenient, and safer.

Potassium Permanganate. — If Potassium Permanganate be administered promptly, before absorption of the poison has taken place, it is the best antidote to all organic poisons, inasmuch as it rapidly destroys them by oxidation. It has been claimed that this result is secured not only when the Permanganate encounters the poison by direct contact with it in the stomach, but also after both poison and anti-

dote have been absorbed into the circulation; but the latter claim has not been satisfactorily substantiated. **Potassium Permanganate is particularly applicable to Eserine** (Physostigmine), **Opium, Phosphorus, Morphine,** and **Strychnine salts, in the stomach.** As an antidote to organic poisons in general, it should be given in 3 to 4 grain doses in about 4 ounces of water, every half hour until four or more doses have been taken. As an antidote to Morphine or its salts, 10 to 15 grains may be dissolved in ½ to 1 pint of water and given. It is common to repeat the dose every half hour until three or four doses have been taken. When the poisoning is by Laudanum a few drops of Dilute Sulphuric Acid or two teaspoonfuls of Dilute Acetic Acid or white vinegar should be added to the antidote. Potassium Permanganate is promptly decomposed by Alcohol, and by the usual stomach contents, urine, etc. So organic matter in stomach may interfere. Locally, this antidote is good in snake poison, in a one per cent. solution, by hypodermic injection about the wound, if applied promptly before absorption of the venom.

Potassium Bicarbonate and the **Carbonate, Sodium Bicarbonate** and the **Carbonate,** may be used as antidotes to most of the poisonous metallic salts, particularly those of Zinc, which they immediately decompose, forming insoluble basic compounds. They are also used against Bromine, Iodine, and Potassium Bichromate. They form the neutral Chromate with Potassium Bichromate and harmless salts with Iodine. They may be used in dilute solutions against non-concentrated acids, but should not be used against the concentrated mineral acids, as they generate large volumes of Carbon Dioxide which might distend and rupture the eroded stomach. Chalk is inapplicable for the same reason.

No alkaline Carbonates or Bicarbonates should be administered in poisoning by Oxalic Acid, as

the resulting oxalates are soluble and almost as poisonous as the Acid itself.

Potassium Iodide in 5 to 30 grain doses three times a day in chronic poisoning by Arsenic, Mercury, or Lead, or their salts, encourages their elimination.

Sodium Chloride (common salt) is the best antidote against the silver salts, as it converts them into the insoluble Chloride of Silver. It should be given in dilute solution and may be combined with albumin, which is also good for the same purpose. A strong salt solution is employed as an antidote to the stings and bites of insects. Two teaspoonfuls of salt in water frequently serves as an efficient emetic. (Also see Salt Sol. p. 118, No. 5.) Little's Saline Solution: Sodium Chloride 1 drachm, Potassium Chlorate 6 grains, Sodium Phosphate, 3 grains, Sodium Carbonate, 20 grains, Alcohol, 2 drachms, Distilled Water 20 ounces; mix. "Blood lavage" (drawing off blood by bleeding, then infusing at least twice as much salt solution intravenously or otherwise) has been found serviceable in poisoning by illuminating gas, Potassium Chlorate, Amyl Nitrite, Nitrobenzol, Hydrocyanic Acid, etc. Avoid in edema, and nephritis.

Sodium Hyposulphite (Sodium Thiosulphate) is an efficient antidote for Iodine, Potassium Iodide, Bleaching Powder (Calcium Hypochlorite), Labarraque's Solution, and Javelle Water reducing them to chlorides and itself oxidizing into the Sulphate.

Starch, made into paste by mixing one part of Starch with fifteen parts of hot water gradually added, is the antidote for Iodine and Bromine, producing compounds which are almost harmless. It has a slight antidotal action against corrosive acids, Corrosive Sublimate, Copper Sulphate, and Zinc Sulphate. **Wheaten flour** is also a good antidote to the foregoing. **Cooked Starch** is more efficient than the raw Starch, but the delay necessary to procure the former is not warranted by the degree of superiority over the latter. In poisoning by Iodine preparations, free vomiting or lavage should be encouraged as long

as the rejected liquid tinges blue a solution of Starch. The blue color which Starch strikes with Iodine offers the surest test for the presence of Iodine in the urine and other secretions of the body, after the Iodine has been set free by Chlorine Water and Nitric Acid.

Iodide of Starch has been employed as an antidote to poisons in general, and in poisoning by the salts of Lead or Mercury it is thought to aid their elimination. It is not an irritant and can be given in large doses but must be removed from the alimentary canal by emetics and cathartics.

Acid Tannic (Tannin) precipitates and forms Tannates with the alkaloids and their salts, with Antimony and Zinc compounds, and the glucosides. The Tannates are nearly insoluble, but not absolutely inactive, being somewhat soluble in dilute hydrochloric acid of the gastric juice, also readily soluble in dilute alcohol; therefore use emetics and active purgatives for their prompt removal from the alimentary canal. Tannin renders Tartar Emetic harmless (but albumin does not) by forming an insoluble Tannate of Antimony. Tannin should be given in doses of 20 grains in a coffee-cupful of water or as much as 45 grains in a pint of water every fifteen minutes. By combining about ten per cent. of its weight of Iodine with it, its efficacy as an antidote to vegetable poisons is increased, but not over ten grains of such mixture should then be given. When Tannin is not at hand, use decoctions or infusions of Tea, Coffee, Nut-galls, Kino, Rhatany, Catechu, Oak, Willow or Cinchona barks, or other substances containing Tannin.

Turpentine, Oil of.—Old, crude, resinified, and French Oil of Turpentine are antidotes against poisoning by Phosphorus, forming an almost insoluble mass with it—the so-called Turpentine-Phosphoric Acid. The fresh, **ordinary Oil of Turpentine is of doubtful value as an antidote to Phosphorus poisoning,** but **Oil of Turpentine which has**

long been exposed to the air and hence contains much oxygen is a very good antidote. One hundred times as much Oil of Turpentine should be given as there was Phosphorus taken; give it in hot water or alone (floated on the water or in capsules) immediately after the Phosphorus is taken, or as soon thereafter as possible; considered valueless if not given within twelve hours. Do not give it with an oil, soup, milk, white of egg or other albuminous substance; nor should mucilaginous or alcoholic drinks be allowed with it; nothing but the capsule or hot water. If it cannot be determined what quantity of Phosphorus has been taken, the Oil of Turpentine may be given in four doses of ½ drachm (2 cc.) each, at 15 minute intervals. If the stomach will not retain the Turpentine inject it into the rectum, atomize it into the lungs, saturate the air of the room with its fumes, or rub it into the skin in the form of a liniment. The acid French Oil of Turpentine, forms a crystalline, spermaceti-like mass with the Phosphorus, and although an efficient antidote is soluble in Ether and Alcohol.

Water may be given as an emetic, used tepid and in large quantities. Washing out the stomach with the stomach tube is now resorted to in nearly all cases of poisoning. However, in Sulphuric Acid poisoning the introduction of water, unless very copiously, is inadvisable, if much of the acid has been taken, as severe heat is evolved. In Oxalic Acid poisoning it is contra-indicated if it is possible the poison may have been taken in the solid form, as solution and absorption of the poison is favored by water; and otherwise an emetic may be given even in water if vomiting did not occur spontaneously, and the symptoms of corrosion have not been marked. In all cases in which a large dose of a concentrated corrosive poison has been taken, the stomach pump should not be employed.

GENERAL ANTIDOTES WHEN THE NATURE OF THE POISON IS UNKNOWN.

When the nature of the poison is unknown the following is **a good and harmless antidote to most poisons, but of little or no value in poisoning by Antimony, caustic alkalies or Phosphorus:**

Equal parts of **Magnesia, Charcoal (Wood), and the Hydrated Oxide of Iron,** mixed and freely given in plenty of water. Two ounces of each to 12 ounces of water recommended by Jeannel. (The Magnesia is given to neutralize any acid that may be present. The Charcoal to precipitate or absorb any alkaloid. The Hydrated Oxide of Iron to combine with any arsenical compound). On a similar basis, the following may be given: Magnesia, 1 tablespoonful; Tannic Acid, 1 tablespoonful; Charcoal, 2 tablespoonfuls. Mix and give 1 teaspoonful, stirred in water, every 5 to 15 minutes. Evacuate stomach soon after using this antidote.

The following antidotal preparation delays the action of the salts of Copper, Morphine, and Strychnine. It has also some effect on compounds of Mercury. It is a perfect antidote to Arsenic, Digitalin, Zinc, etc., but it is of no value against Mercuric Cyanide, Hydrocyanic Acid, the caustic alkalies, Tartar Emetic, or Phosphorus. The preparation is as follows:

Liquor Ferri Sulphatis (specific gravity 1.45) 2½ ounces kept in one bottle, Magnesia Calcinata 2 ounces, Carbo Animalis 1 ounce, Aqua 20 ounces, mixed and kept in another bottle. When this antidote is required, the contents of the first bottle should be poured into the second bottle and the mixture thoroughly shaken. The dose of the mixture is 1½ to 3 ounces.

Reference must here again be made to Bouchardat's antidote for vegetable poisons, consisting of: Iodine, 3 grains; Potassium Iodide, 30 grains; Distilled Water, 11 ounces; mixed together. The dose is 1½ to 3 ounces, frequently repeated.

PHYSIOLOGICAL ANTIDOTES AND MEASURES—THERAPEUTIC AGENTS

AGENTS ACTING ON CENTRAL NERVOUS SYSTEM: (Stimulants): Alcohol, strychnin, (Act on spinal cord). Atropin, belladonna, caffein, (Act on brain and medulla). (Depressants).—(Act as sensory paralyzants): Chloroform, ether, ethyl chlorid, (Induce sleep, quiet, rest). Alcohol, asafetida, chloral and preparations, bromides, codein, morphin, opium and its preparations, camphor monobromate, hyoscin, paraldehyd, physostigma—(depresses cord), scopalamin, sumbul, sulphonal, trional, valerian, veronal, etc.

ANESTHETICS (General): Chloroform, ether, nitrous oxide gas. (Local): Cocain (eucain, novocain, procain, etc.), ether, ethyl chloride, ice, menthol.

ALIMENTARY SEDATIVES (Motor and Reflex): Gallic and tannic acids; belladonna; bismuth, calcium and opium preparations; delmulcents.

ANODYNES AND ANALGESICS (Quiet pain): Acetanilid, aconite, alcohol, ammonia, aspirin, atropin, belladonna, bromides, camphor, chloral, chloralamid, chloroform, cocain, codein, cold, cresol, hyoscin, Hoffman's anodyne, hypnotics, lupulin, ether, ice, lysol, morphin, menthol, oil of wintergreen, opium, phenacetin, potassium and sodium salts and preparations, salicylic acid, soap, fixed oils, etc.

ANT-ACIDS: Calcium and magnesium carbonates. Ammonium, lithium, sodium and potassium salts and preparations. Urotropin.

ANTHELMINTICS: Aspidium, chenopodium, chloroform, calomel, pelletierin, purgatives, spigelia, salol, santonin, thymol, turpentine, etc.

ANTI-EMETICS: Bismuth, camphor and sodium, preparations; cerium oxalate, cocain, camphor, calcium preparations, cresol, chloral, chloroform, ingluvin, lime water, menthol, various opium preparations.

ANTISEPTICS (Urinary, etc.). Aspirin (acetylsalicylic acid), benzoic, boric and salicylic acids; naphthalin, copaiba, cubeb, mecury salts, resorcin, lysol, phenol, hydrogen peroxide, iodoform, potassium permanganate, salol (phenyl salicylate), sandalwood oil, sodium benzoate and sulphocarbolate, salicylates, thymol, urotropin, etc.

ANTIPYRETICS: Acetanilid, antipyrin, aspirin, phenacetin; aconite, quinine, salicylic acid, salicylates, guaiacol, diaphoretics, diuretics, purgatives, cold applications.

ASTRINGENTS: Alcohol, alum, bismuth, copper, iron, lead and zinc preparations; kino, krameria, witch hazel, gallic and tannic acids.

BITTERS (Increase alimentary secretion): Gentian, cinchona and nux vomica preparations, etc.

CARDIACS: Digitalis, strophanthus, (Strengthen contraction). Atropin, caffein, camphor, (Accelerate pulse). Aconite, digitalis, veratrum, (Slow pulse). Infundin (pituitrin) (Slows and strengthens heart beat and increases blood pressure).

CARMINATIVES: Alcohol, ammonia, menthol, peppermint, rhubarb, spearmint, wintergreen, camphor, capsicum, cardamon, essential oils, ginger and other spices, etc.

DEMULCENTS (For mucuous surfaces): Acacia, almond, barley, honey, soap, starch, licorice, egg, glycerin, fixed oils, milk, certain pulpy fruits, moss, potassium chlorate, tragacanth, marshmallow, slippery elm, flaxseed, gelatin, etc.

EMMENAGOGUES: (To encourage menstrual flow): Vegetable purgatives (especially the more drastic); corpus luteum.

EMOLLIENTS (Skin remedies): Almond, lard, linseed, etc., oils; cacao butter, clay, glycerin, paraffin; petroleum preparations—albolene, lavolin, vaselin, etc.; bismuth, magnesium, talcum, zinc, etc., prepara-

tions; fomentations; poultices of bran, bread, flour, figs, flaxseed and oatmeal; meat, molasses, soap, starch, etc.

EYE AND SKIN ACTION AGENTS:

To Dilate Pupil and Relax Accommodation: Atropin, belladonna, cocain, homatropin, scopolamin, hyoscin.

To Contract Pupil and Ciliary Muscle: Physostigmin salicylate, pilocarpin hydrochlorate, etc.

To Increase Perspiration: Camphor, ipecac, morphin, opium, pilocarpin, etc.

To Reduce Perspiration: Agaricin, atropin, belladonna.

GENITO-URINARY AGENTS: Genital: Analgesies, anodynes, antacids, antipyretics, antiseptics, astringents, calomel, demulcents, emollients, narcotics. Gonorrhoeal and syphilitic remedies.—arsenic, mercury, etc.; sedatives, etc.

Urinary: Antacids—(To reduce acidity): Hexamethylenamin (urotropin), potassium acetate, bicarbonate and citrate; sodium bicarbonate and carbonate.

Diuretics (Increase flow of urine): Acetates, carbonate, and citrates; caffein, calomel, digitalis, infundin (pituitrin), potassium and sodium salts, spartein, sulphate, squill, strophanthus, theobromin, water, etc.

To Increase Hemoglobin: Iron, manganese, potassium permanganate.

To Alkalinize: Alkaline acetates, carbonates, bicarbonates, citrates.

To Increase Coagulability of Blood: Calcium salts; coagulose, serum of horse, or of human blood, etc.

HEPATIC AGENTS—To Increase Secretion and Flow of Bile—(Cholagogues, etc.): Aloes, calomel, colocynth, jalap, podophyllum, rhubarb, sodium phosphate and other salts, etc.—Salicylic acid, ox gall (fel bovis), etc.

HYPNOTICS OR NARCOTICS: Alcohol bromides, cannahis Indica, chloral and compounds, hyoscyamus, hyoscin, scopolamin hydrobromid, opium, morphin—Dover's powder, and various opium alkaloids and their preparations and combinations, etc.; paraldehyd, sulphonal, trional, veronal, etc.

PURGATIVES:

Mineral, Saline, Animal: Calomel, magnesium, potassium and sodium preparations; glycerin, mineral oil, ox gall, sulphur, petrolatum, phenolphthalein, infundin (pituitrin) (increases intestinal peristalsis).

Vegetable: Aloes, aloin, castor oil, olive oil, cascara, colocynth, croton oil, elaterium, jalap, podophyllum, rhubarb, sonna.

RECTAL AGENTS: Enemata, salves,—suppositories, etc. Enemata: Nutritive.—First cleanse bowel by using soap suds or other purgative enema, followed by salt solution irrigation. Nutritive enema of not over 6 ounces, to be given at temperature of 100° F. Give slowly every 3 to 6 hours through small, soft tube. A nutritive enema: Beat up egg and add to ½ pint of warm milk; then add the contents of a Fairchild's peptonizing tube and let mixture stand, in warm place, an hour. Take one-half of this and add to it 1 or 2 ounces of thick corn or oatmeal gruel, or flour paste, and give, through tube, as high enema; set other half aside for next time. Purgative:—Soap suds made with such soap as castile: Introduce a quart hot; may add 1 to 2 drams of turpentine well stirred in, or a tablespoonful of glycerin, for effectiveness. The "1, 2, 3 Enema of hospitals is epsom salt 1 ounce, glycerin 2 ounces, water 3 ounces; 1 or 2 teaspoonfuls of turpentine is sometimes added. In gaseous distension of the bowel, milk and molasses each a pint well mixed, to which is slowly added a tablespoonful of turpentine well stirred in acts likewise; or may use a turpentine emulsion of: turpentine 1 teaspoonful added drop by drop to a beaten-up egg; then stir in glycerin 6 tablespoonfuls gradually added, and complete by adding soap suds to make a pint. Starch enema: a teaspoonful of starch stirred in cold water until smooth to which is then slowly added about ½ pint of boiling water, then boil 2 minutes. Cool to about 100° F. and inject.

Olive oil (sweet oil), linseed and cotton seed oils at about 90° F, are each given, as an enema, in doses ranging from an ounce to a pint, and followed by a soap suds enema in 2 to 4 hours; by mouth, these oils, in one or more teaspoonfuls. However, in poisoning by cantharides, copper salts, or phosphorus, it is best to avoid using them either way. Rochelle salt 4 to 6 ounces, or epsom salt 2 to 4 ounces, in warm saturated solution as an enema at bed time, followed by soap suds in about 8 hours is serviceable.

RESPIRATORY AGENTS:
To Stimulate the Respiratory Center; Atropin, caffein, camphor, strychnin.
To Reduce Irritability of Respiratory Center and Lessen Cough: Chloroform, codein, heroin, morphin, opium, etc.
To Increase and Thin Bronchical Secretion: Ammonium carbonate and chlorid; apomorphin, ipecac, potassium and sodium salts, iodids, squill.
To Lessen Bronchical Secretion: Atropin, belladonna, benzoin, turpentine, etc.
To Relax Bronchical Spasm: Amyl nitrite, atropin, belladonna, bromides, chloroform, nitroglycerin, potassium iodid, sodium iodid, sodium nitrate, chloral and preparations, morphin, opium, etc.

SKIN IRRITANTS: Alcohol, ammonia, camphor, cantharides, capsicum, croton oil, cold and heat, iodin, menthol, mustard, peppermint, wintergreen, turpentine, etc.

VASCULAR AGENTS: To Contract Vessels—(Increasing blood pressure): Adrenalin (epinephrin), belladonna, caffein, ergot; and various hypophosphis (or posterior lobe of the pituitary body) preparations, such as infundin (pituitrin, dessicated pituitary body, dessicated hypophysis, pituitary extract, etc.).
To Relax or Dilate Vessels—(Reducing blood pressure): Amyl nitrite, nitroglycerin, sodium nitrite, sweet spirit of niter, heat, etc.
To Deplete and Remove Fluid: Cold, Digitalis, calomel, squil, strophanthus; also diaphoretics, diuretics; saline and vegetable purgatives, etc.

BEST TIME TO GIVE MEDICINES

As a rule, the best time to administer a medicine is between meals when the digestive processes will not be interfered with; but there are various exceptions to this rule.

Dilute acids, alkaline tonics, bitters and other stomachics should be given 10 to 20 minutes before food is taken, as they then diffuse best through the mucous membrane into the blood, and stimulate the secretion of the gastric juice.

By giving an acid shortly before food is taken will also restrain movement of normal acid-forming materials toward the stomach, thereby preventing excessive formation of the acids of the gastric juice; but, dilute acids and alkaline tonics given as digestants, and pepsin, should be administered about 15 to 30 minutes after the meal. Alkalies as correctives of acidity ½ hour or more after eating. Diastase should be given at beginning of meal; pancreatin and oxgall 1 or 2 hours after eating. Laxatives and cathartics act best when stomach is empty.

Iodin and the iodids should be given when the stomach is nearly empty, and they will rapidly diffuse into the blood; if given when much food is in stomach, starch or acids present alter and weaken.

Silver oxid and nitrate, after digestion is completed; for, if given during it, action will be interfered with by chemical changes. Corrosive sublimate, gallic and tannic acids, weaken gastric digestion and should be given between meals. Narcotics at bedtime or earlier; also purgatives then, or in early morning.

Irritating medicines and powerful metallic and other salts, such as

those of zinc, copper, arsenic, mercury, iron, bromids, etc., as well as oils, malt extracts, phosphates, etc., should be given, as a rule, with or immediately after food. Sodium bicarbonate on empty stomach enters blood as alkali; if given during digestion neutralizes the HCl of the gastric juice and is changed to sodium chlorid and sets CO^2 free.

FREQUENCY IN ADMINISTRATION

There is no established, general rule covering the frequency with which medicines should be given. Some years ago it was the custom to give most medicines, except laxatives and hypnotics, at or about meal-time. This was partly due to the fact that very many medicines were more or less nauseous, and were more readily retained if taken in conjunction with the food; it was also in part due to the belief that at least the main and dependable effects of most medicines were exhausted at the expiration of the time ordinarily considered as required to complete digestion, or in about 4 to 6 hours.

Since that time more definite and accurate knowledge, as to many physiological functions, has been acquired. The field of pharmacodynamics has been developed and has furnished much valuable information as to the action of various medicines; chemistry and pharmacy have supplied very many, altogether new, very palatable or actually tasteless, as well as very convenient, products and preparations, for medicinal use. All of these have materially influenced medical methods and procedures, including frequency in the administration of medicines.

It is evident that frequency in giving a medicine largely depends upon how long it takes a dose of it to begin to act; and upon how long before its action practically ceases. Some medicines are slow to act and may be very slowly or imperfectly eliminated or used up; therefore accumulate in the system; perhaps are deposited in certain organs; therefore they may act sometime after administration of them has ceased—among these are arsenic, atropin, belladonna, the bromides; digitalis, digitali, mercury and its salts, strychnin, anodynes, hypnotics, etc.; ordinarily these should not be given often without close and careful observation.

Some medicines such as the volatile ones (ammonia, etc.), act very rapidly, and as a rule their effects are comparatively transient; usually they should be given every 1 to 3 hours; but in some instances 3 times a day or less suffices.—Among these are ammonia preparations, alcohol, camphor preparations, caffein, chloral, chloralamid, iodids, nitroglycerin, salicylates, strophanthus, strophanthin, strychnin, etc. It should be noted, that when given frequently, the dose of a powerful medicine is less, usually, than when given only 2 or 3 times a day, but is influenced by the urgency of the symptoms or condition and the effects secured. In summer the system does not bear strong medicines as well as in winter. When a prompt and emphatic physiological effect is desired a single large dose may suffice, as with purgatives, hypnotics, etc.

A drug will produce its characteristic effect more readily if it is given with other drugs of the same class; and both together may produce a more emphatic effect than either could alone; such is true of bromides and chloral for sleep; calomel and jalap as purgatives; etc. On the other hand, drugs of opposite, physiological effects although acting on the same structures, may each lose much or all of its power, if given together: e. g., bromides prevent strychnin convulsions, although both act on the spinal cord. Digitalis slows the heart, by stimulating the vagus center; but atropin depresses the vagus nerve endings, preventing such effect; therefore they should not be given close together if such effects is desired. A medicine intended to be used to counteract a poisonous effect must frequently be given in larger doses than usual; but always cautiously.

Note: The chief poisons are alphabetically paged in this "Part II" of the book. Read N.B. below.

PART II.

POISONS AND ACUTE POISONING: HISTORY, SYMPTOMS AND TREATMENT.*

N. B.—The doses in this chapter are for adults, and are to be modified according to the urgency of the symptoms, and discontinued or reduced when the symptoms are relieved. The Digitalin referred to is the "German." Frequently it is necessary to repeat antidote and evacuant, and to give lukewarm water freely to wash out the stomach.

The author has endeavored to place together poisons exhibiting similar phenomena or for which the same treatment is eminently applicable.

The **symptoms** of those poisons with which, in the opinion of the author, even the **pharmacist should be familiar, are in bold face type. The principal procedures in treatment are in the same type.**

The resort to oxygen inhalations and to artificial respiration manually or by pulmotor is always justifiable, and the neglect to do so may be censurable.

The Pulmotor is an apparatus for rhythmical and protracted inflation of the lungs with oxygen, and removal of the air when the lungs are distended. It therefore produces artificial respiration. Such apparatus often is used at hospitals and elsewhere in suffocation and in collapse.

ACETANILID (ANTIFEBRIN) — ANILIN — ANTIPYRINE — EXALGIN — PHENACETIN—ETC.

HISTORY:

All of these drugs are more or less dangerous. Probably Acetanilid and Antipyrine the most so.

Fatal dose: Death has resulted from 5 grains of Acetanilid, and a recovery from poisoning by 340 grains of it. 30 grains of Phenacetin has caused death. 3 ounces of marking ink, consisting mainly

*For hints on suspicious symptoms of poisoning, see page 331. Diagnostic hints, pages 253, 261, 313, 329, 331, 338.

of Anilin, has caused death within 12 hours. Anilin is an oily fluid having a peculiar and distinctive odor. The fatal dose of Anilin is considered to be about 6 grammes, but recovery has occurred after 10 grammes. Poisoning has resulted from 7 grains of Antipyrine; also from 3½ grains; recovery has occurred from an ounce after 14 hours' unconsciousness. A Vienna report in 1890 attributes 17 deaths to this drug, by arrest of the heart.

Death from these poisons is the result of cardiac depression.

SYMPTOMS:

More or less sweating, depression, cyanosis, and collapse.

[In Acetanilid poisoning, hemoglobin and hematin are found in the urine. Symptoms of poisoning by Exalgin sometimes resemble those of angina pectoris or those of Carbolic Acid, with dyspnœa, cyanosis and renal disturbances. In Antipyrine poisoning a rash resembling measles usually appears. In Anilin poisoning the pulse is small and frequent; the patient smells of Anilin; the urine may be brown to brown-black; at the end coma and convulsions; jaundice often follows recovery. The outward application of Anilin causes eczema. (Use Hydrog. Perox. or Pot. Permang.) In chronic poisoning by Anilin the perspiration has a reddish color.]

TREATMENT:

Put patient in the recumbent position.

Loosen clothing; supply fresh air and give Oxygen if possible, to overcome the cyanosis.

1. **Evacuate the stomach;** syphon out the stomach with a stomach-tube, or give an emetic of Zinc Sulphate (20 grains dissolved in a wineglassful of water, repeated once in 15 minutes if necessary), or Mustard (a tablespoonful in a small cupful of warm water, repeated in 15 minutes if vomiting has not occurred). Give saline purgative.

2. **Stimulate** with Caffein Citrate (1 to 4 grains

every ¼ to 1 hour), or Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour).

Encourage respiration by giving Strychnine Sulphate (1/60 to 1/20 gr. doses every ¼ to 2 hours).

Sustain blood pressure by Atropine Sulphate (1/120 to 1/60 gr. hypoderm. every ½ to 2 hours).

3. **Employ artificial heat** (apply bags or bottles of hot water, or bricks, stove-lids, or bags of salt, heated), to maintain the bodily temperature.

4. **Perform artificial respiration if necessary** (rhythmically raise arms extended at sides to up over head and back again, 18 times a minute).

In poisoning by inhaling Anilin, fresh air, oxygen inhalations, ether injections and general stimulation are the best measures to employ.

ACID ACETIC—VINEGAR.

HISTORY:

Glacial Acetic Acid, used to destroy warts, may be mistaken for medicine. A large quantity of Vinegar may be taken by mistake and act as a poison. Concentrated Acetic Acid is very corrosive.

Fatal dose: 1 oz. concentrated Acetic Acid.

Symptoms and treatment as in Mineral Acids (q. v.). [Q.V.=Quod Vide=which see].

PHENOLS:

ACID CARBOLIC (PHENOL, PHENIC ACID, BENZOPHENOL) — CARBOLINEUM — CREOSOTE — GUAIACOL — CRESOLS: CREOLIN; LYSOL; SAPROL — PYROGALLOL—ZIRATOL—SOLUTOL—ETC.

HISTORY:

Carbolic Acid, a coal tar, is a colorless product when anhydrous; upon adding 5 per cent. of water it becomes liquid; upon exposure to light it may turn red. It is a powerful escharotic and neurotic poison. Probably Phenol, Lysol, Oxalic Acid and Gas are the poisons most commonly used for sui-

cide; but they are rarely used for murder. A Carbolic lotion has been given fatally by mistake for medicine. Poisoning has occurred from using too strong a solution as injection; from a spray; from a strong salve for itch or other skin affections; also from absorption when used as an antiseptic in surgical dressings. If urine becomes dark colored in using Carbolic Acid, discontinue use.

*[When fatal, death usually occurs in from ½ to 4 hours after the poison has been taken. The shortest times have been, in one case 3 minutes in another 5 minutes; longest times, 60 hours; also 5 and 7 days.

Fatal dose of Phenol, from ¾ drachm up; usually ½ to 2 ounces. As a rule, ½ ounce fatal; 6 or 7 grains have caused dangerous symptoms; recovery from over an ounce. Death from ¼ ounce Creosote; recovery from an ounce. Death from 1 drachm Lysol; recovery from 3 ounces. Death is due to cardiac and respiratory paralysis. Death, if prompt, may result from syncope; if prolonged, from apnœa.

Caution. Restored consciousness and apparently almost complete recovery may be followed, shortly or in some hours, by collapse and death. Patient should be kept quiet until recovery is fully established. Cresol is cresylis acid or methyl phenol—3 varieties: ortho-, meta- and para-cresol. Solutol: cresol and sodium cresolinate. Lysol is an impure para-cresol, consisting of tar, resin, rat, linseed oil, soap and potassium, saponified by boiling. Saprol: oily mixture, 40 per cent impure cresols in petroleum hydrocarbons. Creolin contains various aromatic substances, mainly cresols.] [Lysol: cresol, linseed oil, potassium, soap. Cresol is methyl phenol.]

SYMPTOMS:

*[Usually, but not always, an immediate burning pain from mouth to stomach, accompanied sometimes by vomiting; usually a whitening of lips and mouth, also of esophagus and stomach; the breathing is labored; as a rule there is dizziness and later loss of consciousness; early low temperature, sometimes later very high; diminished and greenish, brownish or black urine, the urine and breath having characteristic odor of Carbolic Acid, or Creosote, or such; pupils contracted; collapse. Lysol stains brown and causes slippery feeling on lips and mouth.]

TREATMEMT:

Usually treatment must be prompt to be effective. Remember that Carbolic Acid, although so called,

*Author's uncondensed text.

is not an acid, but belongs to the class of bodies known as phenols, and has but feeble acid properties.

Phelps says: "Alcohol is a perfect antidote to the corrosive effects of Carbolic Acid." The corrosion produced by Carbolic Acid is superficial as a rule. In absence of extreme damage to mucosa of stomach (as indicated by small quantity of poison taken, its not being in pure state, just taken, or pain not being very severe), the stomach-tube may, as a rule, safely be introduced. When corrosion severe, omit evacuant treatment, and limit alcohol to 4 ounces, **well diluted.**

Avoid use of oils and glycerine (except milk), as they favor solution and absorption of the poison.

Antidotes: Alcohol, any soluble sulphate, soapsuds, vegetable demulcents, albumin, magnesia.

1. Give a cupful of **Alcohol** and water (4 ounces **of each,** or less water) and at once remove it with **the** stomach-tube, if possible, syphoning it out. If the stomach-tube is not at hand, may use Mustard (a tablespoonful in a small cupful of water), or much better, Apomorphine Hydrochlorate, hypodermically (1/10 grain). The Alcohol protects the stomach from the corrosive effects of the Carbolic Acid, probably by its dilution of the Carbolic Acid and its effects upon the walls of the stomach, delaying or preventing absorption. It also acts as a stimulant. The Apomorphine not only has a prompt emetic effect upon the more or less paralyzed stomach, but also controls any inclination to acute alcoholism. (Owing to the anesthesia of the mucous membrane of the stomach, emetics are, as a rule, not very effective).

If Alcohol is not at hand, use a cupful of clear Whisky, Brandy, Gin, Cider Vinegar, or Rum for the Alcohol they contain.

The administration of the alcoholic preparation, followed by evacuation of the stomach (if possible by the stomach-tube), should be repeated every 5 to 10 minutes, from 4 to 8 times, according to the severity of the poisoning. Washing out freely with much water is also good secondary treatment.

In the absence of Alcohol, a very dilute Acetic Acid

has been employed. Chiefly owing to its albuminous nature, milk is beneficial; also white of egg.

2. **Administer one of the soluble sulphates next,** such as Sodium or Magnesium Sulphate (in ½ to 2 ounces, or 1 to 2 tablespoonfuls, doses in a cupful of water) to hasten the elimination of such portion of the Carbolic Acid as may have entered the circulation. Half a pint of such solution, ¼ the strength, should be left in the stomach for continued absorption.

3. **Stimulate heart, circulation, and respiration** by Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief, using one every 15 to 30 minutes). A hypodermic injection of Sulphuric Ether (15 minims) may be employed. A hypodermic injection of Strychnine Sulphate (1/60 to 1/20 grain every ¼ to 2 hours), or Tincture of Digitalis (5 to 10 drops), or Digitalin (1/100 grain) every ½ to 2 hours, may be helpful. Artificial respiration, also saline (5, Page 118), if required.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

5. **Give demulcents** (such as milk, white of egg, flaxseed, or elm tea, gruel or magnesia in water), as an after treatment, to soothe and protect the mucous membrane. When egg and milk are given, they serve to also nourish and sustain the patient.

Apply mustard paste to abdomen. Employ friction and faradism to extremities.

Among other treatments which have been recommended are Lime Water and Syrup of Lime; also soap-suds. Also Sodium Carbonate as a mouth wash.

6. **May give Opium** (Powdered Opium, 1 or 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every

¼ to 2 hours), to relieve severe pain and nervous irritability and to sustain the resisting force.

The treatment for poisoning by Creosote, etc., is the same as that for Carbolic Acid.

In poisoning by absorption from antiseptic dressings, a lotion of 5 per cent. solution of Sodium Sulphate is said to be an efficient antidote. Vinegar, especially Cider Vinegar, or oil (after alcohol), are efficient dressings in external injury or corrosion.

ACID CARBONIC [GAS] (CARBON DIOXID; CO_2)—CHOKE DAMP (CO and CO_2).

HISTORY:

Poisoning by breathing foul air of an overcrowded room or one in which there is a charcoal or gas stove and insufficient ventilation; air of wells, cellars, mines, or other excavations or inclosures illy ventilated or poisoned by decomposition or gas following explosions. (When flame of lowered candle is dimmed, air is poisonous. If there is about 15 per cent CO_2. present the flame is extinguished.)

Fatal dose: 10 to 15 per cent. of this gas in the atmosphere is considered fatal; 2 per cent. is dangerous if long breathed.

SYMPTOMS:

Throat inflamed; sense of weight and pains in head; drowsiness; giddiness; ringing in ears; loss of muscular power; dyspnœa; lividity of face and body; violent heart action; convulsions; coma: death; face may be swollen or livid and pale.

TREATMENT:

1. **Carry patient at once into pure air. If possible give Oxygen inhalations. If respiratory movements have ceased, dash cold water on the face and chest to awaken by reflex action; if there is no effect, resort to artificial respiration, and keep it up for an hour.** If heart has stopped, strike sharp,

quick blows upon the chest, in the heart region. Inhalations of Ammonia, or of Amyl Nitrite, or an enema of strong coffee is sometimes serviceable. If the heart does not begin to beat soon after beginning artifical respiration, the jugular vein may be opened (avoid entrance of air) to relieve distension of the right ventricle. [The jugular vein is selected because there are no important valves between it and the heart.] Recovery may occur after long insensibility.

2. **Friction and heat applied to the extremities.** Electricity (interrupted current to limbs). Stimulants. Inject a pint of hot strong coffee into rectum. Use catheter if long unconscious.

ACID CHROMIC — NEUTRAL CHROMATE OF POTASH — BICHROMATE OF POTASH— NEUTRAL CHROMATE OF LEAD (CHROME YELLOW).

HISTORY:

Persons engaged in the manufacture of Potassium Bichromate experience a nauseating bitter taste in the mouth, sneezing, irritation of nose and eyes, sores on the hands and body. Wherever skin denuded it acts as a cautery. Has a tendency to attack septum of nose, which it may destroy.

Potassium Bichromate is much used for dyeing purposes. 2 drachms have caused death in 4 hours, but ½ ounce has been recovered from. A piece of Chromate of Potash the size of a hazel nut has caused death. Breathing Chromate of Lead dust has caused death, also eating cake ornaments containing this poison. [Deaths in 40 min. to 10 days.]

SYMPTOMS:

Pain in stomach; colic; cramps in legs; vomiting; purging; dilated pupils; great depression; collapse. Chromic Acid vomit produces yellow stain on cloth.

TREATMENT:

1. **Evacuate the stomach.** In poisoning by the acid employ stomach tube and much water to syphon out stomach; or use Mustard (a tablespoonful in a wineglassful of tepid water, repeating every 15 minutes until vomiting occurs). If Mustard is not at hand, may use Zinc Sulphate (20 grains, repeating in 15 minutes if necessary), or give Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 minutes until effective), or give Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeating in 15 minutes if necessary). Give Calcined Magnesia, or Magnesium Carbonate (1 to 4 tablespoonfuls stirred up in a cupful of milk or water) freely, as an antidote. Lime water, or chalk in water may be freely used.

2. **Stimulate heart, circulation, and respiration** by Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), and by inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief, using one every 15 to 30 minutes). A hypodermic injection of Sulphuric Ether (15 minims) may be employed. A hypodermic injection of Strychnine Sulphate (1/60 to 1/20 grain every ¼ to 2 hours) may be helpful.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body) to maintain bodily temperature.

4. Protect mucosa of stomach by administering demulcents (as milk, gruel, flaxseed or elm tea).

6. **Give Opium** (Powdered Opium, 1 or 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ¼ to 2 hours), to relieve pain and nervous irritability if present and severe.

ACID HYDROCYANIC (PRUSSIC ACID) — BITTER ALMONDS, AND THEIR OIL — CHERRY LAUREL WATER—SCHEELE'S ACID—PEACH KERNELS—ETC.

HISTORY:

Poisoning may be the result of accident, suicidal intentions, or the effort to commit murder. It has resulted from inhaling the vapor of the anhydrous acid, from the use of the cyanides, from the acid itself, or from vegetable substances containing amygdalin. This latter substance readily undergoes decomposition, resulting in Hydrocyanic Acid and other products. Hydrocyanic Acid is a constituent of bitter almonds, cherry laurel, cherry, peach and plum pits. The Dilute Hydrocyanic Acid should contain 2 per cent. of the anhydrous acid. Oil of Bitter Almonds contains 10 to 15 per cent. of Hydrocyanic Acid.

The acid is equally severe in its action whether swallowed, inhaled, dropped into the eye, or applied externally. It may cause death in 2 minutes. Death has been delayed to 1½ hours, but usually occurs within 15 minutes; may occur instantly. Inhalation of the vapor has caused death.

Hydrocyanic Acid enters the blood, forming a compound with its hemoglobin, passes to the medulla oblongata, and paralyzes centres of respiration.

Fatal dose: 6/10 to 9/10 gr. of the anhydrous Acid; 40 min. of Dilute Hydrocyanic Acid (U. S. P.); recovery after ½ oz. 2% sol. (4.8 gr.); recovery after 1 drachm of Scheele's Acid (equal to $2^2/_5$ grains of the anhydrous acid); 80 almonds fatal; 4 to 6 will poison a child. Death after 17 drops of Oil of Bitter Almonds; also recovery after 4 drachms; but 20 drops is considered a fatal dose. Death in 2 min. to 3½ hrs.

SYMPTOMS:

The symptoms come on in the very act of swallowing or almost immediately. The breath has the

characteristic odor of Bitter Almonds. Respiration difficult, expiration prolonged; pulse imperceptible; eyes glassy, prominent; pupils dilated; wild cries; involuntary urination and defecation; convulsions; asphyxia; cyanosis; paralysis; general collapse; coma; death. In small doses, giddiness, weakness.

TREATMENT:

1. **The most serviceable methods in great emergency** are artificial respiration, the use of Ammonia, by inhalation, hypodermically and by mouth diluted; Chloride of Lime alone or moistened with vinegar and held to the nose; the employment of douches of cold water poured from a height, cold affusions to the spine, friction and stimulation.

(Put patient in a horizontal position out in the air.)

If there is time, immediately vomit, or wash out the stomach with a dilute (1 to 3) solution of Hydrogen Peroxide, or of Potassium Permanganate (20 grains to a pint of water) in order to change, if possible, the Hydrocyanic Acid into the nearly harmless oxamid. May give Javelle Water (1 teaspoonful in a cupful of water), or Chlorine Water (a tablespoonful in a cupful of water), or use a Chlorine spray. May give a hypodermatic injection of the ordinary solution of Hydrogen Peroxide (¼ teaspoonful every 5 minutes until respiration and circulation improve, then occasionally); or give by mouth.

There is no known, altogether reliable, antidote, although it has been claimed that Ferrous Sulphate is a good chemical antidote. Hence may well wash out with or give: Potassium Carbonate (20 grains in a wineglassful of water), immediately followed by Ferrous Sulphate (Copperas) (10 grains) and Tincture of Chloride of Iron (1 teaspoonful in 2 tablespoonfuls of water). Or give Magnesium Carbonate (1 teaspoonful), stirred up in water to a thin cream; then dissolve Ferrous Sulphate (12½ grains) and Solution of Ferric Chloride (16 drops) in a

wineglassful of water. Mix these and give them, to counteract about 1½ drachms of the Dilute Acid.

A mixture of the Ferrous and Ferric salts, as an antidote, to be followed by a solution of Potassium or Sodium Carbonate, or Hydroxide, the combination producing the inert Prussian Blue in the stomach, has been highly recommended. Cobalt Nitrate (1 oz. of ½% sol. subcutaneously) has proved efficacious.

2. **Evacuate the stomach** (after antidote), with stomach-tube until odor of acid absent, or tickle fauces with feather, or press finger down throat, or give emetic of Mustard (tablespoonful in wineglassful of water). When bitter almonds or similar kernels, which contain amygdalin, have been eaten, Zinc Sulphate (20 grains in a tablespoonful of water), or Apomorphine Hydrochlorate (1/10 grain hypodermically) usually required promptly.

3. **Employ douches**; pour cold water on face, and alternately hot and cold water on chest and spine.

4. **Stimulate.** Give inhalations of Ammonia. Also give Aromatic Spirit of Ammonia, Brandy or Whiskey (1 teaspoonful in a little water every 5 to 15 minutes by mouth, or in double quantity by rectum, or in half quantity hypodermically). Also stimulate with hypodermic injections of Atropine Sulphate (1/120 to 1/60 grain doses), or Strychnine, or use Ether 15 minims (hypoderm), or same of Camphorated Oil. Hot normal salt sol. enema.

5. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

6. **Apply electricity.** Employ a faradic current, applying it to the chest walls, particularly over the heart.

Sometimes must resort to tracheotomy.

If can keep patient alive for about half an hour, recovery is as a rule quite certain.

ACIDS MINERAL (CONCENTRATED): HYDROCHLORIC (MURIATIC ACID, SPIRIT OF SALT)—NITRIC (AQUA FORTIS)—PHOSPHORIC—SULPHURIC (OIL OF VITRIOL)—NITRO-HYDROCHLORIC (AQUA REGIA)—NITRO-SULPHURIC (AQUA REGINAE).

HISTORY:

When Hydrochloric Acid poisons, it is usually the result of mistaking it for beer or other beverages. Poisoning by Nitric Acid is usually the result of accident or attempted suicide. Poisoning by Sulphuric Acid is usually the result of mistaking it for a beverage or attempted suicide. Although primary effects of these acids may be recovered from, secondary effects, consisting of stricture of esophagus or stomach, or perforation of esophagus, resulting in death, are apt to occur in a year or two. But the effects are local, not remote. The dangerous qualities of Sulphuric Acid are in proportion to its degree of concentration rather than to the quantity taken.

Fatal dose: Hydrochloric Acid, ⅛ to 1 ounce; usually 1 ounce; recovery has occurred from 1, also 2 ounces; shortest fatal period, 2 hours.

Nitric Acid, 2 drachms; ½ ounce has been recovered from; shortest fatal period, 1¾ hours.

Sulphuric Acid, 1 drachm; greatly depends upon the quantity of food in the stomach; recovery has taken place after 2 ounces; average fatal period, 16 to 24 hours; shortest period, 1¾ hours.

Death from Concentrated Mineral Acids by asphyxia or collapse or perforation of the stomach. Death usually occurs within 24 hours. May be days.

SYMPTOMS:

Pain in digestive tract; thirst intense; swallowing difficult; vomit dark-colored, acid, and containing mucous shreds, parts of membrane of eso-

phagus and stomach, perhaps blood; feeble pulse, clammy skin; collapse; cough, difficult respiration; sometimes constipation; usually stains on lips. Hydrochloric Acid produces on dark cloth first bright red color, which after some days becomes a reddish-brown or yellow. White stains on skin. Mucous membrane of mouth and tongue is gray or white. Nitric and Nitrohydrochloric Acids produce first white, then yellow, and finally brownish-red stains on lips and skin Stain clothing yellow. Sulphuric Acid causes white to black stains and corrosion on lips, and chars clothing, or stains white linen black, dark cloth red or brownish-red; stains other colored materials a bright reddish or yellowish; mixed with water generates heat. (These acids may not stain lips.)

TREATMENT:

Do not use stomach-tube, stomach-pump, or emetics with concentrated acids, lest the former perforate the wall of the esophagus or stomach, or the latter rupture the stomach. Chalk, Potassium, or Sodium Carbonate or Bicarbonate, although antidotes, should not be used, lest the gas generated rupture the weakened wall of the stomach.

Avoid water, unless given rapidly in very large quantity, in poisoning by Sulphuric Acid, as it generates heat, thus increases injury to the stomach.

Antidotes: Much water, magnesia (forms Epsom Salt with Sulphuric Acid), soap, albumin, lime water, whiting, wall plaster, demulcents.

1. **Give much water at once and Calcined Magnesia** in frequent doses (2 tablespoonfuls in a cupful of tepid water or milk). Lime water ad libitum. Soapsuds (castile soap, dissolved in 4 times its bulk of hot water), by the cupful until stomach is soothed. After neutralizing acid give tepid water to aid emesis.

2. **Give demulcents freely** (white of egg, 1 in ½ cupful of water; barley water, flour, flaxseed tea, gruel, starch water, olive oil, or milk), to soothe and protect.

3. **May give Opium or Morphine Sulphate** (a hypodermic injection of ⅛ or ¼ grain), or Deodorized

Tincture of Opium (10 to 15 drops) or Cocain by mouth, to relieve pain. Give ice for pain and thirst. Apply heat to body. If required, stimulants (hypoderm.), nutrient enemas, also tracheotomy. Oil enemata benefit. Chlorinated Soda inhalations for Sulphuric Acid. External parts injured by these acids (as in "vitriol throwing") are benefited by bathing with soap and water, and treating like burns.

ACID OXALIC (ACID OF SUGAR)—POTASSIUM BINOXALATE (SALT OF SORREL, SALT OF LEMON)—ETC.

HISTORY:

Acid Oxalic is a crystalline substance whose crystals sufficiently resemble Magnesium Sulphate and Zinc Sulphate as to be mistaken for them. It is sometimes taken with suicidal intent. Salt of Sorrel is used for straw bleaching and removing ink and iron stains from linen, leather, paper, etc. It has been taken for suicidal purposes. It is an acid oxalate of Potassium, and is commonly called **Salt of Lemon.** It has been taken for Epsom Salt and Cream of Tartar, owing to similarity in appearance.

Fatal dose: 1 drachm of the solid acid has killed; usually ½ to 1 ounce is fatal, but 1 ounce in solution has been recovered from. The solid acid or a strong solution of it has a corrosive effect. The local effect of a dilute solution is slight, usually, but the poison is absorbed and acts as a systemic poison. Half an ounce of the Salt of Sorrel has produced death. Although the soluble salts of Oxalic Acid are almost as poisonous as the acid itself, they are not as corrosive. The Acid stains skin white or brown, clothing brown or orange-red.

Death has occurred in from 3 to 10 minutes, but usually occurs in about an hour. Death has occurred as late as the fourteenth day.

Death by paralysis of respiration and heart. The time of death is not dependent upon the amount and concentration of the poison.

SYMPTOMS:

A hot acrid or intensely sour taste in mouth; burning sensation in esophagus and stomach; intense thirst; distressing cough; severe pain in head, abdomen, and back; tongue swollen; sense of suffocation; usually vomiting of highly acid, greenish, blackish-brown or bloody mucus; black and blue colored face; cold skin; coma; collapse; sometimes convulsions; urine contains crystals of Oxalate of Lime, albumin, and tube casts.

Oxalic Acid, in substance or in strong solution, acts locally as a corrosive upon the tissue with which it comes in contact, and also acts as a true poison. Upon the concentration of the solution depends the predominance of either action. Oxalic Acid in a large dose, and dissolved in a small quantity of water, produces immediate and severe symptoms. In the reverse state the symptoms are delayed and less severe. Death may be caused by dilute solutions without either pain or vomiting having been present, the symptoms being similar to those produced by narcotic poisoning.

TREATMENT:

Treatment must be prompt. The chemical antidote is Lime in any form (such as slaked lime, chalk, whiting, or wall plaster, given freely in water).

1. Give at once Magnesia (2 tablespoonfuls in a gill of milk or water), or slaked lime suspended in a small quantity of water or mucilaginous fluid; forms insoluble oxalate. Saccharated Solution of Lime, a teaspoonful often, or **a soluble Salt of Calcium, or Magnesium,** suspended or dissolved in a **very small quantity of water,** or in some demulcent, as milk, mucilage, or oil, is the proper antidote. Calcium Carbonate, in the form of Prepared Chalk (2 teaspoonfuls at a dose), or Precipitated Calcium Carbonate (2 teaspoonfuls at a dose), is very satisfactory, as with Oxalic Acid it forms Calcium Oxalate, an inert substance. Ordinary chalk, wall plaster, whiting, or powd-

ered oyster or egg shells, in water, or syrup of lime, or a large quantity of lime water, may be administered when better antidotes are not readily obtainable.

Alkalies, such as Ammonia, Potash or Soda, and their Carbonates or Bicarbonates should not be administered, as they form soluble compounds which are almost as poisonous as the acid itself.

If the poison has been taken in a solid form, or it is not known in what form it was taken, avoid use of much water, as by dissolving the poison it favors the absorption of the same.

2. **May conditionally evacuate the stomach.** If poison was not taken in solid form, and was not concentrated enough, or has not been swallowed for a long enough time to have destroyed the mucous membrane (as indicated by severe burning pain, often accompanied by signs of collapse) and vomiting has not occurred spontaneously, may use a stomach-tube to syphon out the stomach, or resort to an emetic. **Avoid the use of the stomach pump.**

In syphoning out the stomach, use Lime Water, with or without oil, followed by pure water. Milk of Magnesia may be substituted for the Lime Water.

Except in very aggravated cases, **emetics may** be employed, even though it be unsafe to use the stomach-tube. **Tickling the fauces with a feather or the finger** will often produce vomiting, and is the safest method.

If not successful may give: Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated every 15 minutes if necessary), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains), or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results; or still better, **Apomorphine Hydrochlorate, hypodermically** (1/10 grain, repeated every 15 minutes until effective).

3. **Give Castor Oil** (2 tablespoonfuls), or Magne-

sium Sulphate (1 to 2 tablespoonfuls in a cupful of water), to clear out the intestines.

When water is admissable, much shouid be given to encourage elimination of the poison by the kidneys.

Apply poultices to the abdomen, and hot fomentations to the loins.

4. **Employ stimulants freely upon signs of collapse** (such as Brandy or Whisky (in tablespoonful doses in a little water), **but only per rectum).**

5. **Give Opium** (Powdered Opium, 1 to 2 grains), or Laudanum (20 to 30 drops at a dose), or give Morphine Sulphate, hypodermically (¼ grain every ½ to 2 hours), if pain is severe.

6. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, or flour and water, or crushed bananas), to soothe and protect the irritated and inflamed surface, as an after treatment.

ACID SALICYLIC — SALOL.

HISTORY:

Salicylic Acid is used as a preservative for keeping cream, wine, lager beer, cider, jams, etc. Death from about an ounce taken in 4 days.

Death results from paralysis of respiration.

SYMPTOMS:

Dilated pupils; quick, deep respirations; dyspnœa; flushed face; ringing in ears; deafness; delirium; may be nose-bleed.

TREATMENT:

1. **Evacuate the stomach**: syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Cupric Sulphate (3 to 5 grains in 2 tablespoonfuls of water every 5 to 10 minutes until

it acts), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective. After emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ½ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary) may be used for the same purposes. Draughts of strong coffee may also be given.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

4. **Give demulcents:** milk and white of egg.

ACID, SCHEELE'S.

(See Acid Hydrocyanic.)

ACID SULPHURIC.

(See Acids Mineral.)

ACID TARTARIC.

HISTORY:

Taken by mistake for an aperient.

Fatal dose: 1 ounce.

SYMPTOMS:

Abdominal pain; vomiting; prostration; convulsions; collapse; death.

Antidote: Lime or chalk.

1. **Give Lime Water freely**; or Prepared Chalk (in 2 teaspoonful doses in a small cupful of water every 15 to 30 minutes), or Magnesia (2 tablespoonful doses in a small cupful of water, repeated every 10 to 15 minutes), or may give with benefit soap suds, or Carbonate or Bicarbonate of Sodium or Potassium in water.

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated and inflamed surfaces.

3. **Give Castor Oil** (2 tablespoonfuls) to clear out the intestines.

4. **Stimulate if necessary** (as described under Jalap (q. v.).

ACIDS, VEGETABLE (CORROSIVE): ACETIC—OXALIC—TARTARIC.

Symptoms and treatment under each name (q. v.)

ACONITE (MONKSHOOD, WOLSFBANE)—ACONITINE—PULSATILLA—ANEMONIN.

HISTORY:

Aconite is an active poison. The plant Monkshood, Wolfsbane or Blue Rocket (Aconitum Napellus) is found growing in cottage gardens. All parts of it are poisonous. The root may be mis-

taken for horse-radish, and the leaves have been eaten in salad by mistake. Tincture of Aconite has been mistaken for cordial, and Fleming's Tincture mistaken for a harmless medicine, and Aconite liniment taken instead of medicine. An overdose of strong tincture is sometimes taken for a cold. Aconite has been used for purposes of suicide and for murder. Pills containing Aconite are sold and indiscreetly used in the treatment of neuralgia. Aconite has been much used by the Hindoos to poison wild beasts and also human beings.

Fatal dose: 1 drachm of the root; 25 drops of the tincture; 4 grains of the extract; 1/16 of a grain of the alkaloid; 1/50 grain nearly caused death; about 1/35 grain by the mouth is believed to be fatal as a rule; hypodermically 1.5 mgrms. Fatal results usually within 3 or 4 hours; has occurred in 8 minutes and has been delayed to 4 days. 80 drops of the Tincture of Aconite taken in 10 doses caused death in 4 days.

Death results from asphyxia or syncope.

SYMPTOMS:

Tingling in mouth, throat and extremities; anesthesia of surface*; muscular weakness, hence staggering; dizziness; burning pain in stomach or abdomen; dilated pupils; slow, weak, irregular pulse; voice suppressed; skin covered with cold sweat; shallow, slow, feeble respiration; face pale; sight often poor; eyes fixed and staring; deafness; vomiting not common, but may begin in an hour, and is then severe; syncope. Patient often conscious to the last.

TREATMENT:

Put the patient in a horizontal position, the head lower than the feet, to prevent syncope. Maintain absolute quiet.

If there is time to do more than employ artificial respiration and stimulation, resort to the following:

*Variation in temperature-sense, of surface, may be determined by employing the TOPOTHERMESTHESIOMETER.

1. **Endeavor to wash out the stomach,** syphoning with a stomach-tube and much water containing Lugols Solution ½-1 drachm to form insoluble Aconitin compound. **Usually advisable to avoid emetics, as they act poorly and exhaust the patient. If given, give cautiously.**

Give Tannic Acid as an antidote (in 5 grain doses), followed by water, **or Animal Charcoal** (powdered and stirred up in water), or the following mixture may be given, to arrest the solubility of the poison: Iodine, ¾ grain; Potassium Iodide, 2 grains; water, 1 ounce. Or give Pot. Permang. 4 gr.

Give a dose of Castor Oil.

2. **Stimulate heart, circulation, and respiration** with hypodermic injections of Ether (10 minims every 10 to 30 minutes), or with Brandy or Whisky (in 2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently); also with Ammonia inhalations or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes by mouth, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours). **Tincture of Digitalis,** as the physiological antidote (30 drops by mouth, or half as much hypodermically, every ¼ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), should be given. Caffein Citrate (1 to 4 grains every ¼ to 1 hour), may be used for supporting purposes. Draughts of strong coffee may be given. Also Nitroglycerine. Camphorated Oil, (hypod.) x-xv min., or in 2 or 3, v min., doses; or a 10% Camphor solution in sterile olive oil, in vii min. doses (hypod.) every 15 min., 4 times if required. It helps sustain heart and circulation between doses of Strychnine.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), **to maintain** bodily temperature.

4. **May give Opium** (Powdered Opium, 1 or 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently) or Morphine Sulphate (¼ grain by mouth or hypodermically every ½-2 hrs.) to relieve pain and nervous irritability.

Apply a mustard paste to the pericardium, and rub the back and legs with hot towels. (See 4, p. 224.)

Resort to artificial respiration if necessary (raising and lowering arms, from straight at sides to up over head and back again, 18 times per minute).

ALCOHOL, AMYL ("FUSEL OIL," POTATO SPIRIT)

HISTORY:

A poisonous and hypnotic preparation from corn-whisky and potato-whisky.

SYMPTOMS:

Slow, shallow respiration; small pupils; breath resembling odor of Amyl Nitrite; muscular rigidity.

TREATMENT:

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

2. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little

water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 20 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

ALCOHOL, ETHYL OR GRAIN (ETHYL HYDROXIDE; ETHANOL) — BRANDY — WHISKEY—GIN—RUM—WINES — BEER —CIDER. *

[Acute Poisoning.] (See p. 138.)

HISTORY:

Symptoms of poisoning usually appear within an hour.

The fatal dose of Alcohol varies. 2½ ounces killed a boy of 9 and a girl of 5 years of age. 4 ounces of Brandy killed a child of 7. The toxic dose of Absolute Alcohol, contained in Brandy, Gin, etc., considered to be 2½ to 5 ounces; smallest fatal dose conc. Alcohol, 3½ to 7 ounces.

Death has resulted in adults from half a pint of Gin; from 2 bottles of Port. Recovery from a quart of Gin, a quart of Whisky, 2 bottles of Port, a pint and a half of mixed Gin and Brandy. Death in child from ½ pint of Gin; also from 2 ounces of Gin; from 1 ounce of Brandy. Recovery from 3 ounces of Rum.

Death by paralysis of heart in minutes, hrs. or days.

"Absolute Alcohol" is Alcohol free from water. "Proof Spirit" is a mixture of spirit and water, containing 49.24 per cent. of Alcohol, i. e., about half and half. "Methylated Spirit" is spirit mixed with

*For Alcohol, Denatured, see p. 138.

10 per cent. of Wood Naphtha. Percentage of Alcohol in some alcoholic drinks: Brandy, 53; Rum, 40 to 53; Whisky, 53 to 54; Gin, 40 to 51; Port, 20 to 25; Sherry, 15 to 19; Burgundy, 13 to 14; Claret, 10 to 17; Hock, 8 to 10; Strong Ale, 6; Stout, 6; Porter, 4; Small Beer, 1 to 2; Weiss Beer, 1; Cider, 6.

SYMPTOMS:

Confusion of mind; giddiness; relaxation of the whole body; tottering gait; hallucinations; stupor; anesthesia; coma; pulse rapid, weak, compressible; skin cool and moist; pupils usually dilated; face flushed, ghastly or bloated; temperature reduced; lips livid; conjunctivæ red; breathing noisy; may be convulsions; coma. The symptoms of Alcohol poisoning often resemble apoplexy, concussion of brain, and Opium poisoning. There is an odor of Alcohol on the breath; may be bloody froth on lips. **Important diagnostic sign: patient may usually be aroused for a short time.** (See chart, Part X.) Sometimes apparent recovery, then sudden death after hours or days.

TREATMENT:

Provide fresh air.

1. **Evacuate the stomach;** thoroughly syphon out the stomach with tepid water, or use an emetic of Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if necessary), or Zinc Sulphate (20 grains in half a wineglassful of water, repeated every 15 minutes until effective). Follow with a laxative and oil emulsion.

Ammonium Chloride or Ammonium Carbonate (30 grains in ½ pint of water, at one draught); cold head-affusions sometimes remarkably restore.

2. **Support.** Give Strychnine Nitrate (1/60 to 1/20 grain every ½ to 2 hours hypodermically). To counteract the stupor give Aromatic Spirit of Ammonia (in ½ teaspoonful doses every 15 minutes or one-half as much hypodermically). Give inhalations of Aqua Ammonia, or use Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and in-

haled, using one every 15 to 30 minutes), to encourage respiration. Also give Atropine Sulphate, hypodermically (in 1/120 grain doses every ¼ to 2 hours), or Tincture of Belladonna (in 20 drop doses every ½ to 2 hours). Give Caffein Citrate (1 to 4 grains every ½ to 2 hours), or strong coffee (½ pint). Digitalin hypodermically (1/100 gr. every ¼ to 1 hour).

3. **Employ artificial heat** (hot water bottles, or hot water in ordinary bottles, or bags of salt, bricks, plates, or stove-lids, heated, applied to feet and sides of body), to maintain bodily temperature; moist heat over kidneys. Cold affusions to head. Friction.

For asphyxia employ galvanic current; for mania, Hyoscine and Morphine. Catheterize a distended bladder. Give oxygen. Use diuretics. Arouse.

ALCOHOL, METHYL (METHYL HYDRATE, METHYL HYDROXIDE, "METHANOL," WOOD ALCOHOL, WOOD NAPHTHA, WOOD SPIRIT, CARBINOL)

Note: METHYLATED SPIRIT consists of Methyl Alcohol 10 parts and Ethyl Alcohol 90 parts.

HISTORY:

The swallowing, or even the exposure to the fumes, or the cutaneous absorption, of Methyl Hydroxide or Methanol—as it is now being called, since the refiners and others have so re-named it and now commonly label it—has produced serious results. The drinking of Bay Rum, Essence of Ginger, and other preparations which have been made from it, or contain it, has produced more or less serious symptoms, even permanent blindness. It is quite evident that when swallowed it is im-

perfectly oxidized in the body and Formaldehyd, Formic Acid or Sodium Formate is formed. Usually, in actively poisonous doses, it attacks and disables the retina and the optic nerve.

It is distilled from birch, beech, maple, oak, elm, and alder. Crude Wood Alcohol is a complex mixture. It is "a vile-smelling, greenish-yellow to dark-brown, nauseous liquid." When highly refined, pure and deodorized, it is colorless, has a burning taste, and a vinous odor. When deodorized (97+%), Methanol so closely resembles pure Ethanol that the average person can scarcely distinguish the difference. It is then sometimes known as Acetone Alcohol, Purified Alcohol, "Bloom," "Columbian Spirits," "Eagle Spirits," "Hasting's Spirits," "Colonial Spirits," "Manhattan Spirits," "Union Spirits," "Lion d'Or," etc. In Canada called "Greenwood Spirits," "Standard Wood Spirits," etc. When mixed with Grain Alcohol, in various proportions, and drunk, it poisons in varying degrees of severity. Painters, shellackers, dyers, rubber tire makers, etc., exposed to the fumes of breathing air charged with the poison may become poisoned. Fat people absorb less of it than lean. Blindness has resulted from free application of Bay Rum, liniments or toilet preparations, or use of flavoring extracts containing it. Sponging the surface of the body with Methanol, or even bathing in water containing it, has injured. Severe symptoms usually result from swallowing such small quantities as from 1 to 8 drams; taken pure, one teaspoonful has produced blindness, and one ounce, death. Death may occur soon after swallowing Methanol, or in one or two days, or even later. Recovery has occurred after taking half a pint. Prompt remedial measures strongly influence the result. If the poison is taken well diluted with Grain Alcohol, or if early vomiting occurs, or if prompt and suitable treatment is employed, a favorable result may commonly be anticipated, at least as regards life. In

the early stages there is an acute acidosis; the poison is eliminated mainly thru lungs, skin, kidneys and alimentary tract; the balance is oxidized into the corrosive formaldehyd and formic acid; latter is end product excreted by kidneys and reduces Fehling's Solution like sugar. The primary lesion may be injury to pituitary body.

[Since active enforcement of the National Prohibition Amendment began, there have been very many cases of Wood Alcohol poisoning, owing to a wide use of it as a beverage or as an adulterant of various beverages. Sometimes such use was due to ignorance of its toxic character and sometimes the result of deliberate and inhuman deception, inspired by greed. The Federal Government has severely penalized many of those who have thus sacrificed or jeopardized the lives or health of others. Gradually the general public has learned that Wood Alcohol is toxic at practically all strengths and in all of its various grades or degrees of refinement. The supply has been reduced through governmental forestry restrictions. There has been increased demand for it in various industries, which now require the full output. The market price has been rising until it is three times that of Denatured Grain Alcohol, although formerly less. Because Wood Alcohol (Methanol) was cheaper than Grain Alcohol (Ethanol), unscrupulous persons have taken every advantage of the fact. As Dr. Charles Baskerville so well says, they "were tempted to use it as a substitute for Ethanol in adulterating whiskey, essences, extracts, bitters, washes, liniments, balsams, perfumes, etc. The victims were generally those who indulged in the commoner forms of whiskey, rum and wine. although persons not addicted to the use of intoxicating drinks were undoubtedly often affected innocently from drinking Jamaica ginger, lemon extract, essences, bitters, medicines, etc., whose chief menstrum was deodorized wood alcohol."

The Federal Government now permits the addition of 1/5 as much Wood Alcohol, as was formerly required, when used in producing Denatured Grain Alcohol. In denaturing Grain Alcohol for use in the arts and industries, and to be tax free, it must have such a substance mixed with it as will "destroy its character as a beverage, or render it unfit for liquid medicinal purposes." The Commissioner of Internal Revenue selected Wood Alcohol as the principal of various substances, such as benzin, formaldehyde, etc., which might be used for that purpose. But even at 2% strength it has been flavored, diluted, and used as a beverage by some, but with injurious effects. It is evident that a lower grade of Methanol, more nauseating and less toxic, will soon be used in producing Denatured Grain Alcohol.

Employing the term Methanol for Wood Alcohol must greatly help to reduce any disposition on the part of the general public to consider it akin to Grain Alcohol (Ethanol) for beverage purposes; and thus, in conjunction with other facts above stated serve to greatly diminish the frequency of poisoning by it.]

SYMPTOMS:

The symptoms and results vary according to the quantity and form in which the poison is taken, and the promptness and character of the treatment given. Unless a dose large enough to produce coma has been taken, the poisonous symptoms do not occur, usually, until the second or third day after taking the poison. The principal ordinary symptoms produced by swallowing the poison are exhilaration, neusea, vomiting, and headache. There may be also abdominal distress, disturbance of vision (dimness, deficient accommodation and reaction to light, dilated pupils). Nausea, vomiting abdominal pain and sudden blindness, should cause suspicion of poisoning by Methanol. As a rule, if vision is disturbed it is observed by second day of symptoms, but may not be before the fifth.

In a severe poisoning by swallowing, quite commonly there is malaise, nausea, vomiting, muscular incoördination, confusion of mind, vertigo, weak, rapid pulse, ashy or cyanotic skin, pain over kidneys, restlessness, diminished respiration, perhaps odor of the poison on the breath, incontinence of urine and feces, and a total blindness may ensue, which may be sudden; it occurs usually in from 12 to 48 hours after first symptoms, if at all, and in a few days, or even a month, slight or nearly complete vision is restored; but frequently it is soon, again, and often permanently, lost, through optic atrophy, etc. There may be depression or excitement, even delirium, a sense of coming and going of sight, eyeballs sensitive to pressure and to rotation, perhaps loss of color sense, unconsciousness, semi-coma, death. The fumes often produce vomiting, headache, chills, vertigo and stupor; sometimes blindness and even death. In a chronic poisoning, due to daily or frequent exposure to the poison, the visual loss may be gradual and the other symptoms obscure.

TREATMENT:

The treatment is evacuant, neutralizing and eliminative; also stimulative and supportive. In carrying out these measures a great variety of agents and methods have been recommended and variously employed.

1. **Evacuant, Neutralizing and Eliminative.**—If it appears that the poison was swallowed within a short time (about ten or twelve hours), and some of it is still in the stomach, endeavor to wash it out, by using a stomach tube, with Sodium Citrate, Carbonate, or Bicarbonate (5 to 15 grains to the ounce), or Ammonium Carbonate (5 to 10 grains to the pint), or Magnesium Carbonate, or Oxide, in the lavage water; in their absence may use a weak soap-suds. With care this may be accomplished even when the patient is unconscious. The lavage helps prevent further absorption of the poison, dilutes and tends to neutralize the effects of such poison as may have been excreted into the stomach, also dilutes the acid fluids present. If nearly or quite conscious, and but little abdominal pain, instead of lavage, an emetic, such as Ipecac, Mustard, soap-suds, Copper Sulphate, or Apomorphine Hydrochlorate (hypoderm.), may be employed, to empty the stomach. (Cases of early and free vomiting are less serious.) After emptying introduce into the stomach, preferably through the stomach tube, Magnesium or Sodium Sulphate (1½ to 2 ozs., in an equal quantity of warm water). Croton Oil (a drop or two on the tongue) is given early, by some. If possible, lavage soon after giving purgative; then repeat latter salt and leave it in stomach.

While waiting for action of purgative salt, also during the first day or longer, well to give Sodium Bicarbonate (2 drams to 1 pint of water) per rectum; or in severe acidosis as in very active symptoms may well give intravenously (1 pint of same

or even double strength solution), observing aseptic precautions and avoiding introduction of air.

When purgative salt has had an opportunity to produce its evacuant and other effects (usually in one to three hours), give by mouth small quantities of a weak alkaline solution, such as Sodium Bicarbonate (¼ to 1 dram in ½ pint of water), or Carbonate (same), or Magnesium Carbonate, or Oxide (2 drams in ½ pint of water), or Ammonium Carbonate (5 grs. in ½ pint of water every two or three hours, for 12 to 15 hours) to alkalize and counteract the acidosis produced by the poison. When alkalization seems well induced the alkali may be required only 3 or 4 times a day (½ to 1 hour before meals) until recovery, but should increase the frequency, if the urine is not alkaline, until it is and less so maintains it. Giving Lime Water and milks occasionally helps. Excessive alkalosis should be avoided lest the kidneys be seriously irritated. A laxative Magnesium or Sodium salt should be employed daily or as needed, to maintain a fairly free catharsis. Normal salt solution (9 grams of table salt in 1 liter of water, or about 2¼ level teaspoonfuls to 1 quart of water, at 100° to 110° F.) per rectum, as an irrigation, also stimulates; or may well introduce and leave it in (¼ as much, ½ to 1 hour); or still better employ it subcutaneously (aseptically, not over one pint at one site, and at 110° to 115° F.), or intravenously (also with due aseptic and air-exclusion precautions, and at about same temperature). Fischer's solution (Sodium Carb. 0.37%; Sodium Chlorid 1.4%) intravenously, or per rectum, is much favored by some. Hot packs, or Pilocarpine, Hydrochlor, (¼ to ½ grain, hypoderm.) used early to cause free perspiration may be very helpful. Potassium Iodid also Donovan's Solution in small doses are favored for their eliminative effects. Elimination of the poison is by the lungs, kidneys and skin, also in

the feces. The poison, as formic acid, etc., is also excreted into the stomach; gastric lavage for two or three days may therefore help much.

2. **Supportive.**—In addition to the restorative effects of the salt solutions referred to above, the lagging forces may be aided by fresh air, a coffee enema (4 to 8 ozs. at 105° to 115° F.), or by Ammonia inhalations, to arouse, etc. Either Caffein (½ to 1 grain every ½ to 2 hrs.), Camphorated Oil (15 minims), or Camphor in Almond Oil (1 or 2 grs.) or Digitalin (1/100 gr. every ¼ to 2 hrs), or Strychnine Sulphate (1/100 to 1/40 gr. every ½ to 2 hrs.), given hypodermically, is helpful. Give each less often as condition improves. Apply heat to the body and feet if the temperature is lowered. Apply moist heat over the kidneys. Give Atropine Sulphate (1/120 gr. every ¼ to 2 hrs.) hypoderm. to increase frequency of heart action and respiratory strength and relieve cyanosis. Aromatic Spirit of Ammonia (15 minims. hypoderm., every ¼ to ½ hour). Oxygen inhalations, and artificial respiration, may prove very helpful in pulmonary or cardiac failure.

Epinephrin (Adrenalin) solution (15 minims of 1 to 10,000 solution, subcutaneously; or much better, diluted with saline solution to 1 to 100,000 and used intravenously), or Thyroid Body for lowered blood pressure. Also solution of Pituitary Body (Liquor Hypophysis—from the posterior lobe—16 minims hypoderm. repeated in ½ to 1 hour if required) to stimulate or to compensate for pituitary injury when such seems to be indicated for incoördination symptoms. Sodium Carbonate, or Citrate, or Borax, or soap-suds enemas may aid. Venesection is recommended for a severe congestion of the venous circulation; if present, remove 3 to 6 ounces of blood before giving an intravenous solution. Calcium Chlorid in 10 grain doses, 3 times a day, may be useful. In coma, use warm baths, then cold affusions. Galvanism for asphyxia, etc.—Ziegler advises negative galvanism, high voltage and low am-

perage, applied directly to eye, for blindness, unless there has been complete destruction of nerve fibers. Hyoscine for mania, or Morphine as a sedative, if required. As recovery progresses, give liquid foods, such as milk, thin custard, chicken broth, etc., until it is well advanced. Demulcents, milk of magnesia, etc., may be found useful at any time.

ALKALIES: AMMONIA—BARYTA (see Barium)—Lime (q. v.)—POTASSA—SODA, and Their Carbonates.

HISTORY:

Aqua Ammonia is sometimes taken by mistake for Lime Water or other Liquid of similar appearance. Ammonia Liniment taken in a similar way. Caustic Potash is rarely taken except by accident.

[In contrast to acids, in poisoning, alkalies do not withdraw water from the tissues and precipitate albumen, but dissolve the latter.]

Fatal dose: 2 drachms strong solution of Ammonia may be fatal; 4 drachms usually so, but an ounce has been recovered from. Death from ½ oz. Caustic Potash. Death usually in 24 hours; may be months.

SYMPTOMS:

Burning pain from mouth to stomach; difficulty in swallowing; vomiting (alkaline); may be vomiting and purging of mucus and blood; skin cold and clammy; pulse feeble; anxious countenance; rapid exhaustion; symptoms of suffocation; convulsions; stupor or coma may be developed.

(Excessive **inhalations** of Ammonia are poisonous or fatal by the resulting irritation and bronchitis).

(Baryta Muriate and Carbonate produce also headache, deafness, and dimness of sight.)

TREATMENT:

1. **As antidotes, give diluted acids, especially vegetable acids:** Vinegar and water, equal parts; Acetic

Acid, diluted (a teaspoonful in ½ pint of water); Citric Acid or Tartaric Acid (½ to 2 drachms in a pint of water), or clear lemon or orange juice, freely. Vinegar with Caustic Potash forms the almost harmless Potassium Acetate.

The fixed oils (such as Castor, Cod Liver, Linseed, Almond, and Olive) form soaps with the free alkalies, and consequently destroy their caustic effects. Butter may be employed.

If there are signs of corrosion, as indicated by severe pain, collapse, etc., **do not use stomach-pump, stomach-tube, or emetics, for fear of perforation or rupture.**

Assist vomiting by copious draughts of tepid water. For inflammation apply leeches.

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces. Ice cream, ice.

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (in 10 to 15 drop doses). Tincture of Digitalis (30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermicallly every ½ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ½ to 1 hour if necessary) may be used for the same purposes. Strong coffee is helpful.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated,

applied to the feet and sides of the body), to maintain bodily temperature. May apply cold over pain.

4. **Give Opium** (Powdered Opium, 1 or 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently) or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

If life is threatened by œdema, promptly perform tracheotomy. When a dangerous quantity of Ammonia has been inhaled, give inhalations of Acetic Acid, Hydrochloric Acid, Chlorine Water, or Vinegar. Relieve pain by slight Chloroform inhalation. Rectal feeding if required.

ALKALOIDS.

HISTORY:

Tannin forms a comparatively insoluble tannate with alkaloids. Potassium Permanganate is useful for many alkaloids. [In poisoning by 2 alkaloids treat the prominent symptoms.]

TREATMENT:

Give Tannic Acid, Potassium Iodide, Albumin, Iodine, Charcoal, strong coffee or tea, emetics and cathartics.

For symptons and treatment in detail see each alkaloid under respective title.

ALOES—BRYONIA—COLOCYNTH—ELATERIUM (SQUIRTING CUCUMBER)—ELATERIN—EUPHORBIUM—GAMBOGE—"HIERAPICRA"—JALAP (q. v.)—MEZEREON—PHYSIC NUT—SCAMMONY, and similar Vegetable Irritants.

HISTORY:

Fatal dose: Aloes, ⅓ to ⅔ oz.; Podophyllin, 5 to 10 gr.; Elaterium, 6 or 8 grs.

SYMPTOMS:

Severe irritation of the intestinal canal, causing pain, vomiting, and purging; cold sweats; usually great prostration; sometimes convulsions; collapse.

TREATMENT:

1. **Evacuate the stomach** (if not emptied): syphon out stomach with stomach-tube, using much water, with ½ pint milk or oil. If stomach-tube not at hand, or poisonous substance is too large to be removed by it, use Zinc Sulphate (20 grains in a tablespoonful of water, repeated in 10 to 15 minutes if necessary), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated in 10 to 30 minutes if necessary). Give tepid water freely.

If the irritant has passed out of the stomach into the intestines, but not away, a purgative, such as Castor Oil (1 to 2 tablespoonfuls), or Epsom Salt (1 to 2 tablespoonfuls) should be given to remove it.

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, elm or flaxseed tea, oatmeal gruel, gelatin, starch or barley water, flour and water, or crushed bananas) to soothe the inflamed or irritated surfaces. Afterwards enemata of the same are soothing.

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (a teaspoonful in water every 10 to 30 minutes, or ¼ teaspoonful as often hypodermically).

4. **Give Opium** (Powdered Opium, in 1 to 2 grain doses every ½ to 2 hours), or Laudanum (10 to 20 drops in water every ½ to 2 hours), or Morphine Sulphate (¼ grain hypodermically or by mouth every ½ to 2 hours), to relieve the pain and quiet the nervous system.

5. **Maintain the body heat** (by applying hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to body and extremities). Apply hot fomentations to the abdomen.

ALUM.

TREATMENT:

Administer Ammonium or Potassium Carbonate or Bicarbonate as antidote. Use emetic and demulcents.

AMYL NITRITE—NITRITE OF ETHYL—NITRITE OF POTASSIUM—NITRITE OF SODIUM—AMYL ACETATE (PEAR OIL).

SYMPTOMS:

At first there is a violent heart action and flushing, from dilation of the capillaries; then there is diminished heart action and contraction of the capillaries; then follow great muscular relaxation; gradual loss of reflexes; yellow vision; pallor; dilated pupils; slow pulse; irregular respiration; sometimes vomiting and convulsions. Blyth says "Warm blooded animals may be thrown by Amyl Nitrite into a cataleptic condition. It is not an anesthetic, and by its use consciousness is not destroyed, unless a condition approaching death be first produced. When this occurs, there is rarely recovery; the animal passes into actual death."

TREATMENT:

N. B.—Whether poison was swallowed or inhaled, put patient in horizontal position and provide plenty of fresh air.

1. **If the poison has been swallowed, evacuate the stomach**; syphon out stomach with a stomach-tube, or use a hypodermic injection of Apomorphine Hydrochlorate (1/10 grain). For Acetate, Sod. Bicarb.

2. **Support.** Give Brandy or Whisky (in tablespoonful doses every 5 to 10 minutes, or ¼ teaspoonful doses hypodermically every 5 to 10 minutes). Give Strychnine Sulphate, hypodermically (1/60 to 1/20 grain every ½ to 2 hours). Aid heart by Tincture of Digitalis (15 drops every 10 to 20 minutes), or give Digitalin (1/100 grain every ½ to 2 hours). May give Atropine and Ergotin.

3. **Douche.** Use alternate hot and cold douches to the chest.

4. **Resort to artificial respiration if necessary** (rhythmically raise and lower arms from straight

at sides to up over head and back again, 20 times a minute).

If the poison has been inhaled, employ Nos. 2, 3 and 4.

ANESTHETICS: CHLOROFORM — ETHER —NITROUS OXIDE (LAUGHING GAS)— ETC. (Chloral, p. 119.)

HISTORY:

Chloroform is sometimes swallowed by mistake, but usually for suicidal purposes. Death from it is, however, usually the result of inhaling too much as an anesthetic. Ether is a less dangerous anesthetic than Chloroform, usually less productive of vomiting, and stimulates heart action. A sleeping person awakens almost instantly upon being exposed to the vapor of Chloroform. A true sudden narcosis is impossible. Chloroform kills 1 in 3000; ether, 1 in 16,000.

Fatal dose: Fatal dose by inhalation of Chloroform, from 15 drops up; by mouth, 1 drachm in boy of 14 years; half an ounce in adult; recovery from 5 ounces by mouth in adult. Probable fatal dose of Ether by mouth, 1 ounce; Chloroform, 1½ ounces.

Death usually by paralysis of respiration. In a few cases by cardiac paralysis. But in poisoning by Nitrous Oxide death is invariably due to asphyxia.

SYMPTOMS:

Chloroform: Stertorous, irregular, shallow breathing; dilated pupils; appearance of cloud passing over face; conjunctiva may be touched without patient flinching. **Symptoms are same when taken by mouth as when vapor is inhaled, but fatal results are deferred.**

Ether (Sulphuric Ether): Cyanosis; jugular pulsation; action of diaphragm suspended, followed by thoracic paralysis; weak, rapid pulse; shallow, labored, stertorous breathing; great reduction of body temperature; dropping of jaw. (Effects longer in appearing than in Chloroform).

Nitrous Oxide (Laughing Gas): A prominent symptom, usually, is delirious laughter.

TREATMENT:

When inhaled:

1. **Remove anesthetic; invert patient; draw tongue well forward with forceps,** or out and in 15 times a minute; maintain inverted position until pulse and respiration are good; expose patient to a current of pure air, or give Oxygen. **Dash, alternately, hot and cold water on face and chest;** in Ether poisoning also dash Ether on chest and abdomen.

Resort to artificial respiration without delay (slowly and regularly sweep extended arms up over head and back to sides, repeating 18 times a minute). Employ a weak electric current to encourage the action of the diaphragm; one pole on the pit of the stomach, other on the larynx. May bandage extremities and compress abdomen to confine blood to vital centers.

2. **Give hypodermic injection** of Atropine Sulphate (1/120 grain, repeated every ¼ to 2 hours) and Strychnine Sulphate (1/60 to 1/20 grain every ¼ to 2 hours), and Tincture of Digitalis (10 to 20 minims), or Digitalin (1/100 grain every ¼ to 2 hours. May also give Aromatic Spirit of Ammonia (15 minims in water every 10 to 30 minutes), by mouth or hypodermically. Give an enema of hot strong coffee (a pint). Amyl Nitrite, Nitroglycerine, or Adrenalinchlorid (subcutan.), may also be used.

Apply Mustard to calves of legs and over heart.

Avoid hypodermic injections of Ether or Alcohol.

If heart is stopped, two or three blows on the chest may start it; sustain by rhythmical pressure over it. May arouse by slapping with wet towel.

3. **Employ friction and apply external heat,** in either poisoning (hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

Dash Ether on chest and abdomen for shock stimulation. Also give inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ½ to 1 hour if necessary), or inhalations of Ammonia.

As relapse may occur, do not leave patient for some time after apparent recovery.

When swallowed: If Chloroform or Ether have been swallowed.

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using water freely, or tickle fauces with a feather, or give Mustard (a tablespoonful in a wineglassful of water and repeat in 15 minutes if necessary), or give Apomorphine Hydrochlorate, hypodermically (in 1/10 grain doses). Zinc or Copper Sulphate also after syphoning.

Give copious draughts of water containing 1 to 2 teaspoonfuls of Sodium Bicarbonate or Carbonate as antidote. Use Oxygen, artif. resp., stimulants.

Demulcents may be necessary. Glucose retards.

4. **Give Opium, to relieve pain when necessary.**—(Powdered Opium, 1 or 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently) or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

Remainder of treatment as in poisoning by inhalation.

ANIMAL AND VEGETABLE PROTEINS (See page 224a).

ANTIMONY AND ITS COMPOUNDS: ANTIMONIAL WINE — TARTAR EMETIC — ETC.

HISTORY:

Antimony has been taken by mistake for Epsom Salt, also for Sodium Carbonate. Has also been considerably used for secret poisoning and murder. The ointment has poisoned externally applied. The

action of Antimony has been mistaken for the effects of diseases, such as gastric or intestinal ulcer or cholera; also for Arsenic poisoning. Antimony is, however, sometimes contaminated with Arsenic. Test urine and vomited matter for Antimony to distinguish from disease. In poisoning by Antimony, urine never suppressed as in Arsenic. Prompt treatment is highly important. In incessant vomiting suspect Antimony compounds or Zinc.

Fatal dose: Tartar Emetic, ½ grain has caused serious symptoms; ¾ grain killed a child in an hour; 2 grains killed an adult; ½ oz. has been recovered from. Death from 2 oz. Antim. Trichlor. Death usually in 24 hours from cardiac paralysis.

SYMPTOMS:

Metallic taste in mouth; violent vomiting of mucus, bile, watery fluid, or blood; purging of intestinal contents, then mucus, bile, and perhaps blood, followed soon by **rice water stools**; pulse imperceptible; respiration shallow; face pinched, livid, and covered by cold sweat; cramps in legs; pain and burning in stomach; difficulty in swallowing; great thirst; debility.

TREATMENT:

Put patient in horizontal position, head lower than feet.

The chemical antidotes are Tannic Acid, which forms the insoluble tannate (give 5 to 20 grains in a wineglassful of water), or Gallic Acid (same), infusion of oak bark, galls, etc., followed by white of egg. May give as an antidote Magnesium or Sodium Carbonate (2 to 4 tablespoonfuls in 4 to 8 ounces of water).

1. **If patient has not vomited, syphon out stomach** with stomach-tube, or **tickle fauces with feather or finger** to induce vomiting, or give Apomorphine Hydrochlorate, hypodermically (in 1/10 grain doses). Give plenty of strong coffee or tea. After syphoning may lavage stomach with solution Tannin (10 to 30 grs. to pint of water). Avoid tube in Chloride

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature. Mustard to epigastrium.

4. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or half a teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain, nervous irritability, etc.

5. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

ARROW POISON: The sap or dried juices of plants belonging to the Strychnos (including the Curare combinations) and Strophanthus families, also the Euphorbiaciæ (Spurgés). Also such proteins as snake venom; etc. (q.v.).

ARSENIC: ARSENOUS ACID — ARSENICAL FLY PAPER — COBALT SALTS — DONOVAN'S SOLUTION — FLY STONE — FOWLER'S SOLUTION — RAT PASTE — "ROUGH ON RATS" — PARIS GREEN (ACETO—ARSENITE OF COPPER)— SCHEELE'S GREEN (ARSENITE OF COPPER)—POISONOUS INSECT POWDER — ETC.

HISTORY:

Arsenic in one form or another is quite a common poison, has almost no taste and is therefore easily given. Poisoning occurs by intent, also from grinding Arsenic in mills, from vapor in smelting copper, from handling or manufacturing certain wall papers, etc., and from various uses in the arts. It is a constituent of various insecticides and used to destroy vermin, various weeds, and in stuffing birds and animals; also for various preservative purposes, to improve the coats of horses, and by dentists in destroying nerves in teeth. Has been taken by mistake for "Salts" or Magnesia. Arsenic with Phosphorus and ground glass is said to be a constituent of a certain rat poison. (Some vermin killers contain Strychnine; some Corrosive Sublimate.) External applications of arsenic may inflame stomach and intestines and kill.

Fatal Dose: Apparently a dose of 3 grains of Arsenic is fatal; but recovery from much more, and probable from 1 grain; also when a large dose produces prompt and copious vomiting. Death from 2 or 2½ grains White Arsenic; also from ½ ounce Fowler's Solution.

Death usually occurs within 24 hours. May occur in 20 minutes, or not for two weeks.

SYMPTOMS:

Burning pain in the esophagus and stomach; pain in stomach is increased by pressure, soon spreads over abdomen; there is frontal headache; colicky pains; sense of constriction in throat, and irritating metallic taste in mouth; more or less

violent, often bloody vomiting and purging; rejected matters, first mucus, then bilious, of a yellowish, brownish, or greenish color, or blue (indigo), or black (soot); stools may become serous or bloody; pulse is small, feeble, and frequent; breathing difficult and rapid; great thirst; urine suppressed; face swollen; extremities very cold; cramps in calves; cyanosis, followed by cramps; convulsions; coma; death. Nettle-rash-like, papular, vesicular or pustular skin eruption in protracted cases. [Symptoms appear in ½ to 3 hours.] Atrophy and degeneration of gastric follicles may result.

TREATMENT:

1. Syphon out stomach with stomach-tube if patient is seen soon after taking poison; if not, give Mustard (a tablespoonful in a wineglassful of water), or Zinc Sulphate (20 grains in 2 tablespoonfuls of water every 15 minutes if necessary), or Cupric Sulphate (3 to 5 grains in a wineglassful of water every 5 to 10 minutes until vomiting results), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results); or give a hypodermic injection of Apomorphine Hydrochlorate (1/10 grain repeated every 15 minutes until effective). Give hot milk before or during evacuation.

The chemical antidote should be given before or when evacuating the stomach; also evacuate after it. (P. 53.)

The chemical antidote is Hydrated Sesquioxide of Iron. In emergency may prepare it by adding an excess of weak Aqua Ammonia to the Tincture or Solution of Chloride of Iron 1 oz., Water 15 oz.; then after collecting the precipitate in muslin and washing it with water, give 2 or 3 tablespoonfuls of precipitate every 10 minutes until symptoms are improved; then evacuate and repeat. Well to give with the antidote some Calcined Magnesia freely, in water.

Ferri Oxidum Hydratum cum Magnesia—the official antidote—made by precipitating solution of Tersulphate of Iron by Magnesia, is usually considered

best antidote. Give often in ½ oz. doses or more. Or give: Tr. Chloride of Iron 2 oz.; Water 2 pints; Magnesia to excess, in 4 doses 15–30 min. apart. May give Dialysed Iron (3 ½-6 followed by salt 3 1, every ¼ to 4 hrs.) **Follow any Iron antidote by ½ oz. Castor Oil.**

If no other antidotes, may use freely raw eggs beaten up in milk with Magnesia; also sugar in milk, which forms insoluble compound with Arsenous Acid.

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces. Also give alkaline mineral waters.

3. **Give Opium** (Powdered Opium, 1 or 2 grs. every ½ to 2 hours), or Laudanum (10 to 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

4. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); for cramp Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours) to prevent collapse. Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given. Saline solution (5, p. 118).

5. **Employ artificial heat** (such as hot water

bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature. Also poultices over stomach.

6. Give large draughts of water containing Sweet Spirit of Nitre (2 to 4 teaspoonfuls), to relieve the tendency to suppression of urine. Ice for thirst.

ATROPINE.

(See Belladonna).

AUTO-INTOXICATION — INTESTINAL AUTO-INTOXICATION; FERMENTATION AUTO-INTOXICATION AND PUTREFACTION AUTO-INTOXICATION. ALIMENTARY TOXEMIA, AUTO-TOXEMIA. [Intestinal Fermentation and Intestinal Putrefaction.]

HISTORY:

*[Auto-intoxication, perhaps, is best defined to be the result of an abnormal general metabolism, or of an abnormal decomposition, originating in the digestive tract—a fermentative or a putrefactive process, or both. The term food-poisoning is applied to the effect produced by the ingestion of foods already in a state of decomposition or in some way poisoned or poisonous before being taken as food. (See Food, Poisonous, p. 144.)

Under food-poisoning would be included the ptomain poisoning, so called, which is due to the ingestion of a protein decomposed previous to its ingestion; also botulism, tyrotoxicon and various similar meat, fish, milk, etc., poisonings, from the ingestion of food unfit for or unsuited to human consumption, ordinarily.

Constipation interferes with the elimination of waste material of toxin-producing, or toxic substances in the alimentary canal, consequently a more or less serious train of symptoms readily results. Poisonous principles may be produced in the alimentary canal and if not destroyed or not eliminated from it, may be absorbed into the blood and poison the tissues of the body. A condition of alimentary autotoxemia.

The digestive, absorptive and assimilative vascular, nervous and eliminating functions of the body are more or less as disordered by the auto-toxemic condition—constituting a disturbance of metabolism.

SYMPTOMS:

Fermentation Auto-intoxication—(The effects of an alimentary decomposition, mainly of a fermentative character.)

*Author's uncondensed text.

The symptoms exhibited by this variety of poisoning are produced mainly by a pathological or abnormal fermentation of carbohydrate foods—the starches and sugars—perhaps augmented and aggravated by the presence of their food associates. The fermentation processes of the carbohydrate foods produce carbon dioxide, acetic, butyric, formic, lactic, propionic, succinic, valerianic and other organic acids, and acrid-acetone or ketone; an alcoholic fermentation also occurs. The symptoms are eminently more mechanical than toxic. The chief symptoms are: Gastrointestinal distension, sense of epigastric and abdominal oppression and tenderness; more or less belching, palpitation, dyspnea, anxiety, irritability, nausea, labored vomiting, constipation, coated tongue, offensive breath and stools (scanty), feverishness, headache, languor, and exhaustion. The severity of the symptoms are largely dependent upon the character of the food taken and of the bacili present, as regards the fermentative activity; also upon the gastro-intestinal mobility, the rate at which the fermentation products are absorbed, and upon the promptness and vigor of the eliminative measures.

Putrefaction Auto-intoxication.—(The effects of an alimentary decomposition, mainly of a putrefactive character.)

The symptoms exhibited by this variety of poisoning are due mainly or primarily to an intestinal pathological or abnormal decomposition of proteid or albuminous foods. These bacilli-instigated, putrefactive processes occur chiefly in the large intestine; but they may take place in the small intestine and extend into the stomach; or the digestive disturbance may begin in the stomach with a fermentation or some imperfect digestive process by which highly irritant food enters the intestine; and in the presence of very many bacteria, various toxic products may result and be absorbed; gastric hyperacidity, and more particularly hypermotility of the stomach, are conducive to a putrefactive process.

In such a process sulphur and nitrogen compounds are formed—chiefly those related to beneze, and called coal-tar, aromatic, or closed-chain compounds. Among such are cresol, indol, phenol, skatol, free nitrogen and hydrogen; acid carburetted and sulphuretted hydrogen also are produced; cadaverin, cystin, leucin, neurin, intrescin, etc., also the blood and nervous system particularly exhibit the effects of the putrefaction.

This form of auto-intoxication is characterized by symptoms which are more of a toxic than of a mechanical nature—there is less abdominal distension and tenderness than in the fermentation form; breath and stools are more foul, usually, and headache more severe and persistent. Vertigo, skin discoloration and eruptions are quite common and severe, also vomiting and diarrhœa; dyspnea, feeble heart action and intense exhaustion with perhaps stupor and collapse may follow.*

*Author's uncondensed text.

TREATMENT:

Evacuation of the stomach and a free catharsis

should promptly be secured. Wash out the stomach with Bicarbonate of Soda water (1 or 2 level teaspoonfuls to the quart of water), or use plain water if other is not convenient. Use much water, and repeat if food or bile come away, but incompletely; if such lavage cannot be employed may give an emetic of mustard (1 tablespoonful in a small cupful of water, repeated in 10 minutes if not effective, or syrup of Ipecac, a teaspoonful every 10 minutes until vomiting results or until 3 doses are taken; or, if stomach appears to be in foul condition and vomiting seems desirable, may give Ahomorphine Hydrochlorate, hypodermically, 1/10 grain, (repeated in 10 or 15 minutes if necessary). In a few minutes give Calomel (5 grains) or Castor Oil (½ oz. or both), judged by torpidity of liver and intestines; follow in 15 min. with copious drafts of water. Intestinal lavage with hot, normal salt solution (2¼ level teaspoonfuls to the quart), may be found very helpful. Salines, as Epsom, or Rochelle Salt, or a Seidlitz Powder. After 20 or 30 minutes, water should be drunk freely to help wash the alimentary canal. Various antiseptics, such as Creosote Salol, Bismuth, Subgallate or Beta Naphtha, Bromide may help destroy the poisons. Supportive treatment followed by a bitter tonic, should be found serviceable.

If necessary draw the urine. Use of the Opium salts, if necessary to relieve pain in head, etc.

Employ Heat; hot water to the feet, and hot bricks, bottles, or water bags to the body. Apply a mustard paste to the feet and over the heart.

Arouse by alternate hot and cold douches to chest. Apply cold to head. Give Chloral or Hysocine for delirium.

Stimulate. Give 15 to 30 drop doses of Aromatic Spirit of Ammonia, and Brandy or Whiskey (a teaspoonful in water by mouth, or ¼ teaspoonful teaspoonful in water by mouth, (or ¼ teaspoonful monia Water to the nostrils. Give strong coffee.

Employ artificial respiration if respiration is interfered with (rhythmically raise and lower arms from sides to up over head and back again, 18 to 20 times per minute).

BARIUM AND ITS COMPOUNDS: BARIUM ACETATE — BARIUM CHLORIDE — BARIUM NITRATE — BARIUM OXIDE (BARYTA)—ETC.

HISTORY:

Barium Chloride is sometimes mistaken for Epsom Salt. Barium Nitrate has been mistaken for Sulphur.

Fatal dose: Death has resulted from 100 grains of Barium Chloride in 15 hours; death has resulted from a drachm of Barium Carbonate; half an ounce of Barium Chloride has been fatal in 2 hours; half an ounce of the Nitrate of Baryta killed a man in 6½ hours. Recovery from 370 grs. Chloride.

SYMPTOMS:

Abdominal pains; cramps; purging; vomiting; feeble pulse; labored and short respiration; dilated pupils; excessive urination; loss of voice, sight or hearing; convulsions; collapse; death.

TREATMENT:

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, or give Mustard (a tablespoonful in a wineglassful of water), or Zinc Sulphate (20 grains in ½ wineglassful of water), or inject Apomorphine Hydrochlorate, hypodermically (1/10 grain). Repeat in 15 minutes if necessary.

As an antidote, give Dilute Sulphuric Acid (½ to 1 teaspoonful in a wineglassful of water), or give Aromatic Sulphuric Acid (same amount), **or Magnesium or Sodium Sulphate** (½ to 1 ounce, or 1 to 2 tablespoonfuls, in a cupful of water, or all three **may be given together in much water.** The purpose in such treatment is to produce the insoluble Barium Sulphate. May give Pulverized Alum (1 drachm in ½ cupful of water). Again wash out stomach.

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, **or**

even crushed bananas), to soothe and protect the irritated and inflamed surfaces.

3. **Stimulate,** if there are signs of collapse, with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours), to prevent collapse. Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given. Chloral for spasm.

4. **Give Opium** (Powdered Opium, 1 or 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently) or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

5. **Apply poultices,** mustard paste or hot water bag, or cloths wrung out in hot water to abdomen.

BELLADONNA (DEADLY NIGHT SHADE) — ATROPINE — HOMATROPINE — HYOSCYAMUS — HYOSCYAMINE — HYOSCINE — STRAMONIUM (JAMESTOWN WEED, THORN APPLE, DEVIL'S APPLE) — DATURINE — DULCAMARA — SOLANINE — DUBOISIA — DUBOISINE — SCOPOLAMINE, ETC.

HISTORY:

Belladonna: Belladonna berries are sometimes eaten by mistake. Infusion of leaves, and extract

have also been taken for other substances. The plaster has poisoned by application. Hyoscyamus has been eaten for parsnips by mistake. The seeds have likewise been accidentally mixed with celery seeds and used in cooking. The tincture has been mistaken for black draught. Stramonium has been used to intoxicate and for murder, in which case it is sometimes mixed with sugar, tobacco or flour. An infusion of the leaves has been accidentally taken for an herb tea, and children have been poisoned by eating the seeds. Extract of Stramonium has been accidentally substituted for an extract of Sarsaparilla. Atropine, etc., externally, poison.

The prognosis usually is good.

Fatal dose: Death from Atropine poisoning usually takes place within 6 hours, and if life is prolonged to 8 hours, recovery is very probable. Most cases recover under treatment. Death has resulted from a drachm of the Belladonna Liniment, and recovery has occurred from ½ an ounce. Fatal results from a few ripe berries; recovery after eating 50 berries. Death from Extract of Belladonna 1 drachm in 2¾ hours; also recovery from 3 drachms of it. Children will take almost as much as adults, as a rule. Death from 1/20 grain Atropine subcutaneously; also from 1/12 grain by mouth, and death is likely when 1 grain has been taken and no treatment follows. Recovery from 5 gr. Sulphate. Death from ⅛ oz. Tincture. Death may occur in 1 or 2 hours; usually within 15 hours. Death by cardiac paralysis. 100 seeds of Stramonium killed child 2 years old. Recovery after ½ ounce of leaves infused in boiling water.

SYMPTOMS:

Heat and dryness in mouth and throat; great thirst, which nothing allays; greatly dilated pupils; indistinct and double vision; giddiness; dry skin, perhaps scarlatinal kind of rash; nausea; vomiting; stupor following delirium; may be excitement, wild talk, laughter and fanciful delusions; rapid pulse; convulsions; coma; death. Sometimes desire but

inability to urinate. Face sometimes red and swollen. The symptoms usually appear in from ½ to 2 hours after taking the poison. Scopolamine effects are similar to those of Atropine, but do not produce dryness of mouth or throat nor the intense thirst; and rash and vomiting may be absent.

TREATMENT:

Before syphoning out the stomach or giving an emetic, give Tannic Acid or Gallic Acid (20 grains in a wineglassful of water, immediately followed by another glassful of water) as an antidote to the poison. Charcoal or a strong decoction of oak bark or tea may be given instead. If none of these are at hand, give a mixture of Iodine 1 grain, Potassium Iodide 10 grains, in a wineglassful of water. Empty stomach in 5 or 10 min. Pot. Permang. is good: (See Opium).

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, using much water; or give Mustard (1 tablespoonful in a small cupful of water, repeated in 10 to 20 minutes if necessary), or Zinc Sulphate (20 grains in half a wineglassful of water, repeated in 10 to 20 minutes if necessary), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated in 10 to 20 minutes if necessary). Follow with Sweet Spirit of Nitre (in teaspoonful doses), or **Pilocarpine Nitrate, the most perfect antagonist** (¼ grain), to encourage elimination of the poison. Atropine dries, Pilocarpine moistens the skin; Atropine accelerates the respiration, Pilocarpine slows it.

2. **Give Opium** (Powdered Opium, in 1 to 2 grain doses every ½ to 2 hours), or Laudanum (15 to 20 drops every ½ to 2 hours), or Morphine Sulphate (in ¼ to ½ grain doses hypodermically every ½ to 2 hours), or Eserine (in 1/60 to 1/30 grain doses every ½ to 2 hours), to quiet the brain. **Morphine** is the best antagonist to the effects of Atropine on the cerebrum, kidneys, heart, pupils, respiration and arterial tension. **Muscarine** is probably the best general antagonist (in doses of ⅛ to 1 grain).

3. **Draw the urine.** Avoid overdose of Opium.

4. **Employ heat;** hot water to the feet, and hot bricks, bottles, or water bags to the body. Apply a mustard paste to the feet and over the heart.

Arouse by alternate hot and cold douches to chest. Apply cold to head. Give Chloral for Hyoscine delirium.

5. **Stimulate.** Give 15 to 30 drop doses of Aromatic Spirit of Ammonia, and Brandy or Whisky (a teaspoonful in water by mouth, or ¼ teaspoonful hypodermically every ¼ to 1 hour). Hold Ammonia Water to the nostrils. Give strong coffee.

6. **Employ artificial respiration if respiration is interfered with** (rhythmically raise and lower arms from sides to up over head and back again, 18 to 20 times per minute).

BENZENE — BENZOL.

HISTORY:

Used in dyeing, cleaning and as a cough medicine. Death in 17 hours from 3 drachms of Benzene.

SYMPTOMS:

Nausea; gastro-intestinal distress; dizziness.

TREATMENT:

1. **When swallowed, evacuate the stomach;** syphon out the stomach with a stomach-tube, or give Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Zinc Sulphate (20 grains in two tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Apomorphine Hydrochlorate (1/10 grain hypodermically, repeated every 15 minutes until effective). After giving an emetic give plenty of luke-warm water to encourage vomiting. Sodium or Potassium Carbonate or Bicarbonate may be administered as an antidote.

1. **When inhaled, provide much fresh air.** Artificial respiration should be resorted to if necessary

(rhythmically raise arms, extended at sides, to up over head and back again, 18 times a minute).

Give Atropine Sulphate (in 1/120 to 1/60 grain doses hypodermically every ½ to 2 hours), or Tincture of Belladonna (15 to 30 drops every ½ to 2 hours by mouth), to overcome depression.

Douche the chest with hot and cold water alternated, to arouse.

Use interrupted electric current over heart to support heart and circulation.

Give Ammonia or steam inhalations.

BENZINE. (See Petroleum).

BLOOD ROOT. (See Sanguinaria).

BORIC ACID. (Treat as for Croton Oil.)

BISMUTH. (Treat as for Arsenic, etc.)

[Use of Bismuth Subnitrate for radiography of gastro-intestinal tract has produced fatal poisoning. Symptoms indicative of nitrates. Prostration, cyanosis, convulsions or coma may occur. Treatment: wash out stomach, employ artificial respiration, oxygen, stimulants, catharsis, etc.]

BROMIDES.

SYMPTOMS:

Nervous system greatly depressed; force and frequency of heart beat much lessened; reduction in temperature, and in number of respirations; muscular weakness, semi-somnolent state or maniacal excitement.

(Bromides are eliminated by kidneys, skin, saliva, bronchial and intestinal mucous membranes, and in milk.)

TREATMENT:

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in two tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Cupric Sulphate (3 to 5 grains in 2 tablespoonfuls of water every 5 to 10 minutes until it acts), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effec-

tive), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Give Opium** (Powdered Opium in 1 to 2 grain doses every 1 to 3 hours), or Morphine Sulphate (in ¼ grain doses every 1 to 3 hours by mouth or hypodermically) to combat mental symptoms.

3. **Support and stimulate.** Give Caffein Citrate (in 1 to 5 grain doses every ½ to 2 hours) to combat depression. Administer Tincture of Digitalis (in 10 to 20 drop doses every 1 to 3 hours) to sustain and regulate the heart. Fluid Extract of Ergot (in 15 minim doses every 1 to 3 hours), or Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours) or Tincture of Belladonna (in 10 to 20 drop doses) to stimulate heart, etc. Brandy or Whisky (in teaspoonful doses by mouth or ¼ teaspoonful hypodermically every ¼ to 1 hour) may be given with the Opium, as a nervous stimulant.

BROMINE.

HISTORY:

An ounce on an empty stomach caused death in 7 hours.

SYMPTOMS:

Inhaled, its vapor greatly irritates the respiratory mucous membrane and the eyes, causing distressing cough, hoarseness, and dyspnœa.

Swallowed, its action is that of an active corrosive poison. It causes violent gastritis, rapid prostration, great anxiety, rapid pulse, trembling of hands, collapse.

TREATMENT:

When Inhaled, provide fresh air; give inhalations of Ammonia or steam; stimulate by Aromatic Spirit of Ammonia (½ teaspoonful in water; also by Atropine as in Chlorine (q. v.). **Give Caffein Citrate** (in 1 to 5 grain doses every ½ to 2 hours). Irritation to bronchi relieved by chloroform inhalations.

1. When Swallowed, evacuate the stomach: Give starch water to form Starch-Brom. Then repeatedly syphon out the stomach with a stomach-tube, or produce vomiting by Apomorphine Hydrochlorate (hypodermically in 1/10 grain doses.) Give Magnesia freely, or Potassium or Sodium Carbonate, or Bicarbonate (a teaspoonful in a wineglassful of water.)

2. **Counteract depression** by giving a cupful of strong coffee, or Caffein Citrate (1 to 5 grain doses every ½ to 2 hours.)

3. **Give demulcents** (such as white of egg, milk, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas) to soothe and protect the irritated or inflamed surfaces. (A 1 to 2 per cent. solution of Carbolic Acid relieves irritant effects on skin.

BRUCINE.

(See Strychnine.)

BRYONIA.

(See Aloes.)

CAFFEINE.

HISTORY:

Recovery after 200 grains.

SYMPTOMS:

Burning pain in throat; giddiness; faintness; nausea; numbness; pain in abdomen; dry tongue; great thirst; trembling of extremities; free diuresis; cold skin; weak pulse; collapse.

TREATMENT:

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in two tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Cupric Sulphate (3 to 5 grains in 2 tablespoonfuls of water every 5 to 10 minutes until it acts), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha 30 grains, or Syrup of Ipecac a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Stimulate heart, circulation, and respiration,** with Brandy or Whisky (in 2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Morphine Sulphate hypodermically (in ¼ grain doses every ¼ to 2 hours) often helps. Digitalin (1/100 grain hypodermically every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary) may also be found useful. Resort to faradization or galvanization of respiratory muscles if required.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates or stove-lids heated.

applied to the feet and sides of the body) to maintain bodily temperature.

CALABAR BEAN (PHYSOSTIGMA, THE WESTERN AFRICA ORDEAL BEAN) — PHYSOSTIGMINE (ESERINE).

HISTORY:

Poisoning occurs from beans eaten by children. The bean is used in decoction by the natives of the west coast of Africa as the ordeal test for witchcraft. They believe the innocent will vomit it, the guilty retain it and die.

Fatal dose: Six beans caused death in boy of 6 years. The fatal dose of Physostigmine is considerably less than 3 grains.

Death results from respiratory paralysis.

SYMPTOMS:

Effects are opposite to those produced by Strychnine.

Tumultuous heart action; complete muscular relaxation and tremors; giddiness; contracted pupils; respiration irregular and slow; reflexes lost; may be vomiting and purging.

TREATMENT:

1. **Evacuate the stomach** with stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Cupric Sulphate (3 to 5 grains in 2 tablespoonfuls of water every 5 to 10 minutes until it acts), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or, best of all the emetics, Apomorphine Hydrochlorate, hypodermically (1/10

grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of lukewarm water to encourage vomiting.

Potassium Permanganate (10 grains in 1 pint of water) introduced into stomach by stomach-tube and repeated in half an hour has been highly recommended.

Give Tannic Acid (30 grains in ½ cupful of water) or draughts of strong tea. **Give Spirit of Nitrous Ether** (1 teaspoonful, repeated every ½ to 2 hours). If urine is suppressed, use Catheter.

2. **Atropine is the best physiological antidote** (antagonist). Give Atropine Sulphate (1/120 to 1/60 grain hypodermically every ¼ to 2 hours for 4 doses, or until the pulse is quickened, or until the pupils dilate), or Tincture of Belladonna (10 to 20 drops in water by mouth or rectum every ¼ to 2 hours, as preceding). If this treatment is ineffective, give Chloral (in 10 grain doses every ¼ to 1 hour in syrup and water by mouth, or in water by rectum). Give Strychnine Nitrate, hypodermically (1/60 to 1/20 grain every ½ to 2 hours), or Tincture of Nux Vomica (10 to 20 drops).

3. **Stimulate:** Give Brandy or Whisky (in teaspoonful doses every 15 to 30 minutes), or Alcohol (½ teaspoonful in tablespoonful of water every 15 to 30 minutes). Coffee may be beneficial.

4. **Artificial Respiration.**—If respiration becomes labored, raise patient's stretched out arms, rythmically, from sides of body to up over head, and back to sides again, 20 times a minute, with tongue kept forward.

CALCIUM.

(See Lime, also Alkalies).

CAMPHOR.—CAMPHORATED OIL.—SPIRIT OF CAMPHOR.

HISTORY:

A popular household remedy, occasionally taken by mistake. May cause very severe symptoms but

rarely fatal. (Spirit of Camphor is 1 to 10; Camphorated Oil 1 to 5 in strength.)

Fatal dose: 20 grains or more. Recovery after 200 grains. Dangerous symptoms from 20 grains and from 15 minims of the strong solution. Death by **asphyxia.**

SYMPTOMS:

Camphor odor; languor; giddiness; clammy skin; headache; smarting in urinary organs; pulse quick and weak; delirium; convulsions; collapse. No purging, vomiting or pain, unless dose very large, when may be burning pain along esophagus and at pit of stomach, and vomiting.

TREATMENT:

1. **Give water** to precipitate the Camphor, if in alcoholic solution. If in oil, alcohol, then water.

2. **Evacuate the stomach;** syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Cupric Sulphate (3 to 5 grains in 2 tablespoonfuls of water every 10 to 15 minutes until it acts), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Syrup of Ipecac (a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic always give plenty of luke-warm water to encourage vomiting.

After emptying stomach give saline purgatives freely.—Some authorities favor giving Castor Oil and Alcohol or Brandy by mouth; others consider these aid in the solution and absorption of the Camphor. If give Alcohol or Brandy, it is better to give it hypodermically.

3. **Allow patient to inhale Ether to check inclination to convulsions.** Relieve cramps with

alternate hot and cold douches. May give Aconite (Tincture of Aconite, 1 drop every 1 to 2 hours), Potassium Bromide (in 10 grain doses every ½ to 1 hour), or Opium (Powdered Opium 1 or 2 grains every ½ to 2 hours), or Laudanum (20 drops in water every ½ to 2 hours) or Chloral to relieve the convulsions. Coffee by mouth or rectum.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates or stove-lids, heated, applied to feet and sides of body) to maintain bodily temperature. Artificial respiration if required.

CANNABIS, AMERICAN (CANNABIS AMERICANA, AMERICAN HEMP)—CANNABIS, INDIAN (CANNABIS INDICA, INDIAN HEMP) — HASCHISCH — GUNJAH OR GANGA OR GANZA — CHURRUS OR CHARAS—BHANG OR SIDDHI.—MARIHUANA.

SYMPTOMS:

Sense of exhilaration; pleasurable intoxication; peculiar prolongation of time; sense of double consciousness followed by drowsiness; anesthesia; loss of power, particularly of lower extremities; pupils dilated; pulse rapid; respiration slow; may cause increased sexual desire; catalepsy; sometimes convulsions.

TREATMENT:

Caustic Alkalies are incompatible.

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, using plenty of water. If the stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipe-

cacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

Give strong tea freely; or Tannic Acid, or Gallic Acid (30 grs. in ½ wineglassful water). **Apply heat.**

Give Sweet Spirit of Niter (in teaspoonful doses every ¼ to 1 hour) to encourage excretion by kidneys. Give orange or lemon-juice to neutralize poison.

2. **Stimulate:** give draughts of strong coffee, or Caffein Citrate (in 2 or 3 grain doses every 1 to 3 hours), Atropine Sulphate (in 1/120 grain doses hypodermically every 1 to 3 hours), or Tincture of Belladonna (10 to 15 drops every 15 minutes, for 2 or 3 doses) as antagonists; Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled) to stimulate circulation. If respiration is embarrassed, resort to artificial respiration. May apply electricity to the chest muscles. **Draw urine.**

CANTHARIDES (SPANISH FLIES) — CANTHARIDIN. (See p. 238.)

HISTORY:

The powder has been taken for jalap and for pepper. Also taken to produce abortion.

Fatal dose: 24 grains of the powder, 1 ounce of the Tincture. Recovery from 2 drachms also an ounce of the powder, and from 6 drachms also an ounce of the Tincture. Fatal period usually from 24 to 36 hours. Death by paralysis of respiratory centres.

SYMPTOMS:

A violent gastro-enteritis, with abdominal tenderness; burning sensation in pharynx and esophagus; sense of constriction of throat; burning pain in back, bladder, and urethra; frequently

great thirst; vomiting, the vomit containing shining particles of the powder; constant desire to pass water, but only blood or albuminous urine passed each time; priapism; sometimes sloughing of the genital organs; strangury; abortion; sometimes violent delirium and tetanic convulsions; coma.

TREATMENT:

There is no known chemical antidote.

1. **Evacuate the stomach:** cautiously syphon out stomach with stomach-tube, using plenty of water. If stomach-tube not at hand, use emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Give demulcents** (such as white of an egg, barley, elm, flaxseed tea, or gruel). **Avoid oils or any oily emulsion, as Cantharidin is soluble in such.**

3. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth, or hypodermically every ½ to 2 hours) to relieve pain and irritation.

4. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate

(1/60 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops every ½ to 2 hours), or Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour) and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary) may be used for the same purposes. Draughts of strong coffee may also be given. Finally, give alkaline diuretics.

5. **Employ artificial heat** (either hot water bottles, ordinary bottles of hot water, bags of salt, bricks, plates, or stove-lids, heated, applied to feet and sides of body) to maintain bodily temperature, etc. **Poultices to abdomen; anesthetics for convulsions.** Wash out bladder with warm water for severe irritation of it. Assist excretion of urea by pilocarpin.

CARBON MONOXID (CARBONIC OXID; CO)—CHARCOAL FUMES, ETC.

HISTORY:

A combustible, colorless, transparent, odorless, tasteless, very poisonous gas. Burns readily in air with blue flame. When cast-iron plates are red hot it readily diffuses through them; thus the gas may pass into air of a room heated by a stove. Defective combustion, open charcoal, coke or stove coal fires, defective stove-pipes or furnace flues and escaping illuminating gas are among its sources. It also collects in mines, pits, wells, etc.; also is produced by gunpowder explosions in quarries, mines and other confined spaces. (See pages 67, 141, 149, 155.)

This gas enters the blood, combining with the hemoglobin of the red corpuscles and displacing the oxygen. The symptoms become urgent when the red blood corpuscles of the body have become half saturated with the poison. After the blood has been

nearly or quite saturated with this gas it will not carry oxygen from the lungs to the tissues of the body; and after 4 to 8 hours of cerebral asphyxia, edematous and degenerative processes seem to begin in the brain; and although the blood may have discharged much of the carbon monoxid poison by that time, the brain cannot adequately be supplied with oxygen, nor its integrity restored; recovery is almost or quite impossible. The blood of those poisoned by this gas is of a persistent fluidity and bright, cherry-red. Air containing one per cent. of this gas will kill a dog in a minute and a half. The gas is a narcotic poison. When patient has been exposed to gas over 8 hours and coma exists, the chances of recovery are slight. If opposite exists, may expect recovery. Other things being equal, the chances of recovery or permanence of injury is in proportion to the length of time the blood has been exposed to the gas and the degree of saturation with the gas, i. e., the degree of systemic asphyxia or oxygen deprivation. Death may occur hours or even days after partial recovery.

Carbon monoxide is the chief constituent of coal gas and poisoning by latter is mainly due to it. But suffocation by coal gas is not to be confused with poisonous effects of coal gas. "Water gas" contains about 30% carbon monoxide.

SYMPTOMS:

[**In Poisoning:**—Dizziness; severe headache; weakness; may be nausea, vomiting; convulsions; face pale, or livid; pupils dilated. When poisoning is very slow, symptoms are languor, debility, anorexia, headache, anemia, perhaps a dry cough, and mental disturbances. Symptoms resemble those of malaria.

In Choking Suffocation:—Symptoms are choking; gasping; suffused eyes; congested face; collapse.

TREATMENT:

1. Promptly provide plenty of fresh air. For absence of breathing, or in feeble breathing, resort to artificial respiration—Schaefer, Marshall Hall, Michigan or Sylvester methods. Oxidizing the poison by using hopcalite (etc., see page 117) has been recommended. The pulmotor is of doubtful utility.

Give inhalations of oxygen, or also of ammonia. Recently

Henderson, Haggard and Scott of Yale University Laboratory, and others, have had excellent results by using, with a special inhaler devised for such purpose, a gas mixture of oxygen containing 5 per cent. of carbon dioxid. This mixture, prepared by the Linde Air Products Co. and the Union Carbide Co., of New York City, and others, has proved very helpful when given simultaneously with the Schaefer prone, pressure method of artificial respiration. As soon as spontaneous breathing is secured these inhalations are suspended, although the patient be still in coma; usually giving them for 20 to 40 minutes is sufficient. They help to prevent the commonly fatal pneumonia. Rest and feeding should complete the recovery. Oxidize the poison by using hopcalite (a mixture of oxids of manganese, copper, cobalt and silver).

2. Other measures, sometimes employed are: Cold, wet applications to head and neck. Douching chest with hot and cold water alternately to arouse and stimulate. Hot applications to feet and body.

Stimulation of heart, circulation and respiration with Brandy or Whisky or Aromatic Spirit of Ammonia, or Strychnine and Atropine; also use of Tincture of Digitalis or Digitalin, Caffein Citrate or Coffee, or inhalations of Amyl Nitrite, or Camphorated Oil (15 min.) hypodermically, or giving lime water, or milk by same; also transfusion of blood, within an hour or two of inception of poisoning. Rectal, intravenous or intracellular injection of normal salt solution sometimes proves very beneficial.

Saline Solution (sterilized normal salt solution = 139 grains of pure table salt in 34 ounces (a liter) of boiling water, a 9/10% solution; about 2¼ level teaspoonfuls of salt in 1 quart of boiling water). Inject 1 to 3 pts. at 100° to 110° F., into rectum, flank, back, arm or abdomen (See pages 57 and 87d)].

N.B.: The bracketed statements in the foregoing are those of the author.

CASTOR OIL BEANS

HISTORY:

The activity of the plant is supposed to be due to Ricin, a poisonous toxalbumin from the seed of the castor oil plant. Ricinin is a crystallizable alkaloid from the plant.

Fatal dose: 3 seeds were fatal to an adult male in 46 hours; 20 seeds killed an adult female in 5 days. Recovery from 30 seeds.

SYMPTOMS:

Abdominal pain, cramps; prostration; vomiting; intense thirst; severe griping, purging, and tenesmus; collapse.

TREATMENT:

1. **Evacuate the stomach:** siphon out the stomach with a stomach-tube, using plenty of water. If the stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced); or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains, or Syrup of Ipecac, a teaspoonful every 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas) to soothe and protect the irritated and inflamed surfaces.

3. **Employ artificial heat** (such as hot water bottles, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body) to maintain bodily temperature.

4. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain, griping, and tenesmus.

CHLORAL—BROMIDIA—CHLORALAMID—SOMNOS—ETC.

HISTORY:

Chloral, and its compounds, quite frequently, injudiciously used by the public to quiet nerves and induce sleep. Chloral is sometimes used for suicidal purposes. In frequent doses it may accumulate and kill by paralyzing the heart. A dose should very rarely exceed 20 grains and should not be repeated as often as hourly more than 3 times. It appears to be a cumulative poi-

son. 10 grains have caused alarming symptoms, 20 and 30 grains have each caused death; even 460 grains has been recovered from, and probably most persons would recover from any dose under 2 drachms if proper treatment given. 3 grains killed a child, a year old, in 10 hours. In some persons large doses temporarily suspend some of the mental faculties without producing apparent unconsciousness. Children bear Chloral proportionately better than adults. Old persons, and particularly those with weak hearts or inclined to apoplexy, are easily affected. Death in 1/6 to 40 hrs. Knock-out-drops often consists of a strong solution of Chloral.

SYMPTOMS;

Loss of muscular power, followed by sleep and coma; respiration slow, shallow, feeble, labored; pulse weak, first slow, then rapid and thready; face white, livid, covered with cold sweat; pupils contracted during sleep, dilated upon awakening; body-temperature greatly reduced. May be delirium; Coma.

TREATMENT:

Put in horizontal position and elevate feet.

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube; or give Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Zinc Sulphate (in 20 grain doses every 10 to 15 minutes), or Apomorphine Hydrochlorate, hypodermically (in 1/10 grain doses every 10 to 15 minutes, until vomiting results), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes, until vomiting is produced). After giving an emetic, always give plenty of luke-warm water to encourage vomiting.

Liquor Potassae (2 teaspoonfuls in a cupful of water is said to decompose 20 grains of Chloral in the blood); drachms **½ to 2** should be given hourly as required.

2. **Stimulate:** give draughts of strong coffee by mouth, or introduce 1 pt. into rectum through tube

or give Citrate Caffein (in 5 to 10 grain doses every ½ to 3 hours). Give Strychnine Sulphate, hypodermically (in 1/60 grain doses every ¼ to 2 hours); or give Picrotoxin (in 1/100 to 1/50 grain doses, repeated every ¼ to 2 hours to stimulate respiration. Also encourage heart action with inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief, using one every ¼ to 1 hour if necessary), and Brandy or Whisky, hypodermically (¼ teaspoonful every 10 to 15 minutes). Keep patient awake, overcoming stupor by shaking, shouting, flagellation, or by shocks of electricity.

Give inhalations of oxygen. May use Adrenalin.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of body) to maintain bodily temperature. This is very important.

Apply cold to head, and Ammonia to nostrils and hypodermically. Resort to artificial respiration, upon respiration becoming more labored.

CHERRY, "Black" or "Wild:" Leaves, fruit and fruit-seeds poison. Cause depression, convulsions. Evacuate and stimulate as in Acid Hydrocyanic (q.v.).

CHLORINE — CHLORINATED LIME — JAVELLE WATER — LABARRAQUE'S (or CHLORINATED SODA) SOLUTION.

SYMPTOMS:

Chlorine **inhaled** causes extreme laryngeal irritation and may even cause œdema, resulting in asphyxia. Black eschars on tongue and pharynx may be produced. Usually cough, a sense of tightness across the chest, and inability to swallow.

If a poisonous dose of these substances be **swallowed,** a sense of heat and burning results, and perforations of the esophagus and stomach may be produced.

TREATMENT:

When Chlorine vapor has been **inhaled,** the patient should inhale Ammonia vapor to form Ammonium Chloride. Provide fresh air, artificial respiration, inhalations of steam, Ether or Chloroform. When Chlorine preparations have been taken into the stomach, albumin is the proper antidote.

1. **Evacuate the stomach.** When Chlorine preparations have been **swallowed,** the stomach should be gently washed out by means of a stomach-tube, or use an emetic, such as Zinc Sulphate (20 grains in two tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Give Ammonia Water** (¼ teaspoonful in a wineglassful of water, repeated in 10 to 30 minutes), or give Aromatic Spirit of Ammonia (in teaspoonful doses, in a wineglassful of water, every 10 to 15 minutes).

3. **May also stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), also with Strychnine Sulphate (1/60 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a

3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary) may be used for the same purposes. Draughts of strong coffee may also be given. Give lime water, milk, or flour mixed in water. **Artificial respiration.**

4. **Give raw white of egg as the antidote. May give other demulcents** (such as flaxseed or elm tea, barley or starch water, oil, gum arabic, oatmeal gruel, gelatin, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces.

Give Sodium Thiosulphate (20 grains in ½ wineglassful of water).

5. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and restlessness.

CHLORODYNE.

HISTORY:

Irritant narcotic compound of Opium; probably Morphine Muriate, Chloroform, rectified Ether, Prussic Acid, Oil of Peppermint, Gum Acacia and Molasses.

Fatal dose: an ounce has caused death.

Treatment as in Opium or Prussic Acid poisoning.

CHLOROFORM. (See Anesthetics.)

CHOKE DAMP. (See Acid Carbonic.)

CHROMATE—BICHROMATE.

(See Acid Chromic.)

CICUTA VIROSA — CICUTA MACULATA (WATER HEMLOCK) — CICUTOXIN — WATER PARSNIP—ETC.

Nausea, vomiting, pain, nervous symptoms, convulsions, collapse, coma. (Treat as in Conium. P. 130.)

COAL GAS. (See Illuminating Gas.)

COCAINE—EUCAINE.

HISTORY:

Cocaine has a twofold action—it acts upon the central and upon the peripheral nervous system. In small doses it excites the spinal cord and brain: in large ones it may produce convulsions and then paralysis. The peripheral action is manifested by the numbing of sensation.

Fatal dose: death rare; 10 grains or less internally has caused death; 22 grains by mouth caused death within an hour; 7/10 of a grain killed a child; 2/3 of a grain a woman of 71 years; 23 grains, also 32 grains, have been recovered from. Death from 1½ gr. hypodermically; also recovery from 14 grs.; 1/20 gr. hypoderm. caused dangerous symptoms in girl 12 years old; 4½ grains swallowed have produced very alarming symptoms. Used subcutaneously or, in solution applied to eye or mucous membrane acts rapidly, may produce, suddenly, serious symptoms; 7 or 8 minims of a 4 per cent. solution, in eye, have produced spasm and unconsciousness; 20 to 30 drops of a 4 per cent. solution applied to teeth and gums have produced serious symptoms. Twenty minims of 4 per cent. sol., also ½ dram of 10 per cent. sol., also 2½ grs. in solution injected into urethra, have been fatal. Death has occurred in 40 seconds; has been delayed to 4 and even to 20 or more minutes. Recovery is quite certain after 30 minutes.

Death usually occurs from apnoea or heart failure.

SYMPTOMS:

The symptoms vary. As a rule, great nervous excitement, sense of oppression and fulness in head, sometimes associated with nausea and vomiting. In beginning pulse and respiration may be more rapid but later they may be quite slow, and the breathing labored. The face may be cyanotic. The pupils are dilated and extremities cold. In fatal cases there is labored breathing, feeble, perhaps, imperceptible, pulse, convulsions, coma and death. There may be

early delirium and unconsciousness or almost no symptoms except those of asphyxia.

TREATMENT:

Fresh air. Put patient in horizontal position. Artificial respiration at once, if necessary.

Employ stimulants and electricity. Employ the following treatment as far as possible and required:

If Cocaine was introduced hypodermically, give stimulants of hot Brandy or Whisky (2 to 4 teaspoonfuls in water by mouth every 5 to 10 minutes, or more by rectum, or 15 to 30 minims hypodermically every 5 to 10 minutes). Also give inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled). Ammonia inhalations, or Aromatic Spirit of Ammonia (1 teaspoonful in water by mouth, or ¼ teaspoonful hypodermically every ten minutes), or Ether in 15 minim doses hypodermically, or more by rectum, often help; also Strychnine Sulphate (1/60 grain hypodermically), and Atropine Sulphate (1/120 to 1/60 grain hypodermically), or Tincture of Belladonna (20 drops). Nitroglycerine (hypodermically in 1/100 grain doses every ¼ to 2 hours) has been highly recommended. Chloroform or Chloral may be required for convulsions. Morphine Sulphate (in ¼ to ½ grain doses) often is beneficial.

1. **If the Cocaine was swallowed, evacuate the stomach if possible:** syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water), or Mustard (a tablespoonful in a small cupful of water), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful), or Apomorphine Hydrochlorate, hypodermically (1/10 grain). After giving an emetic, always give plenty of luke-warm water, to encourage vomiting. Give Tannic Acid or Gallic Acid (30 grains in ½ cupful of water). **Again in 10 minutes** wash out the stomach or empty it with an emetic. If the Tannic Acid is not at hand, give plenty of strong tea or decoction of oak bark (1 ounce to a small cupful of hot water); or

may give Iodine (1 grain) and Potassium Iodide (10 grains) in ½ wineglassful of water. **Then use stomach-tube or emetic again.** Give inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour, if necessary) to support heart.

2. **Stimulate heart, circulation, and respiration** with Ammonia inhalations and with Brandy or Whisky (2 teaspoonful doses every 5 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 5 to 15 minutes, or ¼ teaspoonful hypodermically as frequently), and Atropine Sulphate (1/120 grain hypodermically), or Tincture of Belladonna (20 drops). To relieve impending collapse or paralysis of respiration, give Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours), or Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically), or Digitalin (1/100 grain hypodermically); the Strychnine may help the cerebral blood-vessels. Caffeine.

3. **Apply artificial heat to heart and body.** Apply sinapisms over heart, stomach and calves. Resort to friction of the extremities.

Oxygen inhalations for inclination to asphyxia.

4. **Artificial respiration if required** (rhythmically raising and lowering extended arms from sides to over head, 18 times a minute). Faradization or galvanization of respiratory muscles may be required.

5. **Give opium, if necessary.** To relieve nervous excitement or delirium, when present, give Morphine Sulphate, hypodermically (in ¼ to ½ grain doses every ¼ to 2 hours), or Laudanum (20 drops every ¼ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently).

6. **Chloroform inhalations,** or Chloral (in 40 to 60 grain doses) may be required to relieve the convulsions. **Nitroglycerine,** hypodermically (in 1/100 grain doses) has been recommended.

7. **Employ cathartic, enema, or both.**

COCCULUS INDICUS (LEVANT NUT, INDIAN BERRY, FISH BERRIES)— PICROTOXIN.

HISTORY:

Picrotoxin is used as a fish poison (ground, mixed with bread and thrown on the water, taken by fish stupifies them, then they float and are taken), as a bird poison, as a medicine, sometimes as "knock-out" drops, and sometimes to adulterate beer. Beer extract containing Picrotoxin is fatal to flies. Picrotoxin poisoning produces an extraordinary swelling of the abdomen in frogs, which Strychnine does not.

SYMPTOMS;

Nausea; vomiting; muscular weakness; drowsiness; sometimes convulsions; may be scarlet-fever-like rash; pain; salivation; diarrhœa; coma.

Fatal dose: 2 to 3 grains of Picrotoxin is considered to be a dangerous dose. Death from paralysis of heart in diastole.

TREATMENT:

Treat as in poisoning by Strychnine (q. v.), and give Paraldehyde.

COLCHICUM (MEADOW SAFFRON, AUTUMN CROCUS) — COLCHICINE.

HISTORY:

All parts of the plant are poisonous. The wine has been taken by mistake for sherry and other wines.

Fatal dose: 45 grains of dried bulb; a tablespoonful of the seeds; of the Wine 3½ drachms, and an ounce of the Tincture. 1½ ounces has caused death; an ounce has been recovered from. The fatal dose of the alkaloid is less than ½ grain. Death from paralysis of respiratory centres. Death usually occurs within 24 hours; it has occurred in 7 hours, and has been delayed for several days.

SYMPTOMS:

Burning pain in throat, esophagus, and stomach; great thirst; soreness; vomiting; violent purging; griping; intense abdominal pain; urine suppressed; face pinched; pupils dilated; profuse salivation; pulse rapid, then slow; great weakness; skin cold, pale, and covered with sweat; frequent spasms; sometimes muscular pains and convulsions; consciousness present until the last; collapse.

TREATMENT:

There is no altogether satisfactory known antidote.

1. **Evacuate the stomach**; syphon out the stomach with stomach-tube, or, if vomiting has not occurred, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective. After giving emetic, always give plenty of luke-warm water to encourage vomiting. **Give Tannic Acid** (in 30 grain doses) or Gallic Acid (in 30 grain doses, in ½ wineglassful of water), or a decoction of oak bark, or strong tea. Irrigate colon with Tannic Acid water.

2. **Give water freely, and administer demulcents** (such as white of egg, milk, oil, gum arabic, elm or flaxseed tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces, particularly in later stages.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated,

applied to the feet and sides of the body) to maintain bodily temperature.

4. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

5. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given. **Apply hot fomentations to the abdomen. Finally, give a dose of Castor Oil** (1 to 2 tablespoonfuls).

CONIUM MACULATUM ("Poison" or "Wild" Hemlock; Poison Root)—CONIIN—CICUTA MACULATA ("Spotted" or "Water" Hemlock; Cow Bane)—CICUTA VIROSA—CICUTIN.

HISTORY:

The bruised leaves of the Wild Hemlock have a mousy odor and nauseating taste. The poison is in the seeds, and when flowering (in July and August) also in the parsley-like leaves, which have been mis-

taken for parsley and eaten in salad and soup. Serious results from 1/5 grain of Coniin. The poison of Water Hemlock is found chiefly in the roots.

Fatal dose of Coniine is about $2^{3}/_{10}$ grains. One drop may cause bad symptoms. Death in ¼-4 hrs.

SYMPTOMS:

Giddiness; staggering gait; gradual loss of all voluntary power; pupils dilated and fixed; paralytic drooping of eyelids; loss of sight; inability to swallow; nausea; maybe vomiting; frontal headache; pulse slow, then increased; sometimes salivation and sweating. Asphyxia from paralysis of respiratory muscles. Paralysis ascends from feet. Is conscious.

TREATMENT:

Keep head low.

1. **Evacuate the stomach**· syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting. **Give Tannic Acid or Gallic Acid** (30 grains in ½ wineglassful of water, repeated in 10 to 20 minutes, if required). If these are not at hand, may give draughts of strong tea, or a decoction of oak bark; or give Iodine (1 grain) and Potassium Iodide (10 grains) in a ½ wineglassful of water. Then again wash out the stomach, or cause vomiting.

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or

even crushed bananas), to soothe and protect the irritated and inflamed surfaces. Then give Castor Oil (a tablespoonful).

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ½ to 2 hours). May give Picrotoxin hypodermically (1/60 to 1/40 grain dissolved in water. Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin 1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary) may be used for the same purposes.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body) to maintain bodily temperature. Employ friction.

If breathing becomes labored, resort to artificial respiration (rhythmically raise arms from side to up over head and back again, 20 times per minute). If convulsions, give Chloroform cautiously.

CONVALLARIA (LILY OF THE VALLEY).

HISTORY:

The common preparations—the extract and fluid extract—contain the two active principles Convallarin and Convallamarin. The former is a purgative, while the latter is a heart poison, quite similar in action to Digitalin.

Symptoms and treatment similar to Digitalis (q. v.).

COPPER AND ITS COMPOUNDS: COPPER SULPHATE (BLUE STONE, BLUE VITRIOL)—VERDIGRIS (COPPER SUBACETATE) — ETC.

HISTORY:

Copper is taken by accident or for the purpose of abortion, suicide, or murder. Commonest cause of poisoning is the use of copper vessels in cooking. Chronic poisoning may result from using copper to give a green color to pickles, preserved peas, and sweets; the use of green wrappers for foods; copper used in the manufacture of artificial flowers; the keeping of drugs in copper vessels; from working in copper or bronze, etc.

Fatal dose: death from an ounce of Copper Sulphate; and also a recovery. Death from ½, also one ounce of Verdigris. Death in 4 hrs. to several days.

SYMPTOMS:

Copperish or metallic taste in mouth; griping and colicky pains; gastro-enteritis; nausea; bluish liquid vomit; purging with straining, stools consisting first of intestinal contents, then mucous or blood; intense salivation and bronchial secretion; incessant expectoration; jaundice; thirst; respiration hurried; anesthesia; delirium; epileptiform convulsions; pulse small, rapid; urine diminished, or suppressed, sometimes black; sometimes syncope; coma.

TREATMENT:

Avoid Vinegar, and Oils.

1. **Give the chemical antidote,** Potassium Ferrocyanide (Yellow Prussiate of Potash, in 5 to 15 grain doses in water); or give albumin and milk, mixed with sugar; or Magnesia. If eggs are not at hand, give a thin paste of flour and water; then

2. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as

Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving an emetic, always give repeatedly plenty of luke-warm water to encourage vomiting and to wash out the stomach. Follow with cathartic.

3. **Give demulcents** (egg and milk mixed and sweetened well with sugar is preferable and indicated; or give barley, elm or flaxseed tea, gum arabic, starch or flour water) to soothe and protect the irritated and inflamed surfaces.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body) to maintain bodily temperature.

5. **Give Opium** (Powd. Opium, 1–2 gr. every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability. **If the breathing becomes much labored, employ artificial respiration.**

6. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of

Belladonna (20 drops every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin 1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee are good.

7. **Saturate the system** with Potassium Iodide (in 3 to 10 grain doses in water).

CORN COCKLE (Crown of the Field).

Poisoning from inferior wheat flour containing cockle seeds. It causes vomiting, disturbed vision, dyspnea, diarrhoea, debility, sometimes death. Evacuate and stimulate as in Laburnum (q.v.).

CROTON OIL (CROTON TIGLIUM).

HISTORY:

The oil and also the liniment have each been taken for Castor Oil by mistake.

Fatal dose: 20 drops of the Oil. Half a drachm has been recovered from. Death in 4 to 12 hours.

SYMPTOMS:

Severe abdominal pain; vomiting; purging; fluid stools; pulse small and thready; skin moist; face pinched; prostration; collapse; death.

TREATMENT:

1. **Evacuate the stomach:** If abdominal pain is slight, syphon out the stomach with a stomach-tube, using much water, with ½ pint milk or Olive Oil, and 1 or 2 eggs, or may use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water), or Mustard (a tablespoonful in a small cupful of water); or Ipecacuanha (Pulverized Ipecacuanha,

30 grains) or Syrup of Ipecac (a teaspoonful); the emetic may be given every 10 to 15 minutes until vomiting results. If abdominal pain is severe, give Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving an emetic, give plenty of lukewarm water to encourage vomiting.

2. **Gum Arabic water and demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces.

3. **Give Opium** (Powd. Opium, 1–2 gr. every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and purging.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature. **Apply linseed meal poultices to abdomen.**

5. **Give Spirit of Camphor** (5 to 10 drops on sugar or in milk at 10 minute intervals, 4 to 6 times).

6. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Spirit of Camphor (5 drops in a little milk every hour or two, if necessary), or with Aromatic Spirit of Ammonia (a teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (10 to 20 drops in water every ½ to 2 hours). Tincture of

Digitalis (15 to 30 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin 1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary, may be used for the same purpose. Draughts of strong coffee may also be given.

CURARE (WOORARI, SOUTH AMERICAN "INDIAN ARROW POISON") — CURARINE.

HISTORY:

If Curare swallowed action much less severe. (see 1.)

SYMPTOMS·

Agitation; the poison wound swollen and painful; voluntary muscles completely paralyzed; temperature elevated; heart slowed; respiration gradually diminished; urine increased and contains sugar. consciousness unaffected. Death by asphyxia.

TREATMENT:

1. The poison is usually introduced through a wound. If there is a wound **ligate** above it; **incise** the part freely and endeavor to **suck out the poison; wash** the wound with a weak solution of Potassium Permanganate. Give Spirit of Nitrous Ether (1 to 2 teaspoonfuls in a wineglassful of water; repeat in 10 to 20 minutes). **Employ artificial respiration** as the most efficient antagonist (rhythmically raise extended arms from sides up to over head and back 18 times a minute) until poison is eliminated. The poison usually passes off rapidly. **Evacuate the bladder frequently, to prevent reabsorption.**

2. **Stimulate the heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonfuls every 10 to 15 minutes, in a little water). Strychnine Sulphate (1/60 grain hypodermically every ½ to 2

hours) has an antagonistic action upon the heart and respiration, and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (10 to 20 drops in water every ½ to 2 hours) has a similar effect.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

CYANIDE OF MERCURY (MERCURIC CYANIDE).

HISTORY:

10 grains, also 20 grains have destroyed life.

Symptoms, chiefly Mercuric; also Cyanic. Treatment: Give Ferrous Sulphate and Magnesium Carbonate (See 1, p. 71). Follow with whites of 3 eggs in cupful of water and flour or thick starch water or milk. Evacuate stomach. Stimulate (See 3, p. 178). Also see Mercury, p. 174).

CYANIDE OF POTASSIUM (POTASSIC CYANIDE).

HISTORY:

Potassium Cyanide is used in electro silvering and gilding, in photography, to clean lace, and also for the purposes of suicide and murder. 2½ grains are equivalent to one grain of the Anhydrous Prussic Acid.

Fatal dose: about 2½ grains is considered to be the fatal dose. Usually 5 grains is a fatal dose, in about 15 minutes. Recovery after 50 grains.

SYMPTOMS:

The Acid properties of Hydrocyanic Acid are very feeble, so that it does not have the effect of the mineral acids on the skin or mucous membrane; but Cyanide of Potassium is very alkaline and has even caustic properties—thus, on an empty stomach has produced a condition similar to that resulting

from a moderate quantity of solution of Potash. Salivation; nausea; sometimes vomiting; sense of constriction in throat; then constricting pain in chest; giddiness; confusion of sight; person falls in convulsions resembling epilepsy; convulsions may be general or attack only certain groups of muscles; sometimes true lockjaw; inspiration short; expiration prolonged and imminence of death increases length of interval between them; skin pale, blue or bluish gray; eyes glassy and staring; pupils dilated; mouth covered with foam; breath smells of the poison; pulse first quick and small, then slower, until imperceptible; convulsions pass into paralysis; respiration gradually ceases. Potassic Cyanide in very strong solution may cause erosion of lips, mouth, throat, gullet, and of much of the duodenum, but rarely. As a rule the local effects are limited to the stomach and duodenum.

TREATMENT:

Treat as in poisoning by Acid Hydrocyanic (q. v.), also employ demulcents if caustic action has been severe.

CYANIDE OF SILVER (SILVER CYANIDE).

SYMPTOMS:

The action is similar to that of Hydrocyanic Acid, but weaker.

TREATMENT:

Give large draughts of Ferrous Sulphate (Green Vitriol, ½ to 2 grains in much water). Then treat as for poisoning by Hydrocyanic Acid.

DENATURED ALCOHOL is Alcohol (Ethyl) rendered unfit for use as a beverage or for medicinal purposes. Formaldehyde, Benzin, Methyl Alcohol, and various other agents have been employed to produce such preparation. In the Southwest, deodorized Wood Alcohol was added to Whiskey, etc., to adulterate such cheaply; the mixture then "known as 'White House,' 'Old Mule,' etc." When Methyl Alcohol is present in a mixture, treat as for such, in case of poisoning.

DIGITALIS (FOX GLOVE) — DIGITALIN — STROPHANTHUS (q. v.) — "KOMBE ARROW POISON" — STROPHANTHIN (q.v.) CONVALLARIA (q. v.) — CONVALLAMARIN — SCOPARIUS — SCOPARIN — SPARTEINE — SQUILL — SCILLITIN — SCILLITOXIN — ADONIDIN — ANTIARIN — HELLEBOREIN — OLEANDRIN — ETC.

HISTORY:

Digitalis has poisoned by being mistaken for other drugs or through ignorant use. Has been used for the purpose of murder.

Maximum dose: Powdered leaves, single, 4½ gr.; daily, 15.4 gr. Infusion, single, 480 min.; daily, 1,440 min. Extract, single, 3 gr.; daily, 12 gr. Tincture, single, 45 min.; daily, 135 min. Digitalin, single, 1/35 gr.; daily, 1/12 gr.

Fatal dose: Tincture of Digitalis, 9 drachms; but 2 oz. have been recovered from. 10 grs. of the powdered leaves have been fatal. Death in hours or days.

Digitoxin is six to ten times stronger than Digitalin and 1/16 grain is considered a fatal dose. The fatal dose of Digitalin is considered to be 3/10 of a grain. Of ordinary commercial Digitalin slightly larger doses would be required to produce a fatal result, but 1/16 grain would be very dangerous.

Digitalin is a cumulative poison, and like all poisons affecting the heart, a dose that once taken is harmless, becomes deadly if frequently repeated. As a rule, double the maximum dose may be considered quite dangerous.

SYMPTOMS:

(Digitalis is the cardiac type, the others act quite similarly.)

Vomiting of matter of a grass green color, mucous and bile; purging with severe pain; severe headache; pupils usually dilated, sometimes contracted; eyeballs bulging; **sclerotic blue colored**; vision dis-

ordered; vertigo; salivation; pulse small, slow, irregular, but rapid and weak upon arising, although heart beats violently; face pale; pain in back and limbs; diarrhœa; suppression of urine; consciousness usually maintained; lethargy, followed by delirium and convulsions; coma; death suddenly. Death by paralysis of heart.

TREATMENT:

Put in horizontal position during and for some time after symptoms subside, to prevent fatal syncope. Keep patient quiet.

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If the stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if not effective), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving an emetic, always give plenty of luke-warm water to encourage vomiting. **While emptying the stomach, give Tannic Acid or Gallic Acid** (30 grains in a cupful of water, then in 10 minutes again evacuate the stomach). If Tannic or Gallic Acid is not convenient, give plenty of strong tea, or a decoction of oak bark (1 ounce to a small cupful of hot water), or give Potassium Iodide (10 grains) and Iodine (1 grain, in half a wineglassful of water).

2. **Then give Epsom Salt** (1 to 2 tablespoonfuls in a teacupful of water), or Rochelle Salt (2 teaspoonfuls in a small cupful of water), then plenty of water.

3. **Then give Fluid Extract of Quillaja** (10 drops in a tablespoonful of water), or Fluid Extract of **Senega** (10 drops in water). For the effects of

large doses, give **Tincture of Aconite** (2 to 4 drops in water every ½ to 2 hours), or Laudanum (15 to 20 drops in water every 1 to 3 hours), **as an antagonist** for effects due to the continued use of Digitalis. May give Atropine, ice or Cocaine for vomiting.

4. **Stimulate** with Brandy or Whisky (2 to 4 teaspoonfuls in water every ½ to 1 hour), or with Aromatic Spirit of Ammonia (a teaspoonful every ½ to 3 hrs.) or Amyl Nitrite. Friction. Keep body warm.

5. **Resort to artificial respiration if necessary** (raise rhythmically arms extended at sides to up over head and back to sides, 18 times a minute).

Saponin and **Senegin** are the most complete physiological antagonists, if available.

EXPLOSION GASES.

The principal gases produced by the action of explosives are Carbon Dioxide, Carbon Monoxide and Nitrogen. Gunpowder gives CO and H_2S; dynamite, gun-cotton, nitroglycerine, tonite, roburite, sicherheit, trinitrintoluol, etc., and the smokeless powders each gives off much CO. (See also pp. 67, 116, 152.)

ERGOT.

HISTORY:

Given or taken to produce abortion.

15 to 60 grains of Ergot have produced very serious symptoms.

SYMPTOMS:

Not very definite as a rule.

More or less gastric disturbance; vomiting; thirst; diarrhœa; burning pain in feet; tingling in fingers; cramps in extremities; **pupils dilated**; dizziness; pulse small, feeble; weakness; **coldness of surface**; sometimes convulsions; abortion or miscarriage in pregnant women. Cataract, or a necrosis of extremities may be secondary effect.

TREATMENT:

Recumbent position.

1. **Evacuate the stomach**: syphon out the stomach with a stomach-tube, using plenty of water. If

the stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

While emptying the stomach, or at first, give Tannic Acid or Gallic Acid (30 grains in a cupful of water frequently). Then in ten minutes evacuate the stomach. If Tannic or Gallic Acid is not convenient, give plenty of strong tea, or a decoction of oak bark (1 ounce to a cupful of hot water), or give Potassium Iodide (10 grains) and Iodine (1 grain in ½ wineglassful of water).

2. **Give Castor Oil** (2 tablespoonfuls), or Epsom Salt (2 tablespoonfuls in ½ cupful of water), or a drop or two of Croton Oil on the back of the tongue.

3. **Stimulate** with Nitroglycerin Hydrochlorate (1/100 grain hypodermically), or with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 20 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one

every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given. For convulsions Chloroform or Bromides.

4. **Employ friction, and artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

If abortion is threatened from Ergot, Opium and rest are most important measures.

*[EUCALYPTUS GLOB. FLY PAPER, POIS'N'S
(Treat as for Turpentine) (Commonly, Arsenic (q.v.)

EUPATORIUM AGEROTEIDES (Ageratum Altissimum) White Snake Root

Found in woodlands, mainly of some Middle West States. Poisons animals, by eating it; man, through milk, butter, cheese, meat. Causes "Milk Fever," "Trembles," or "Puking Fever." Symptoms in man: Restlessness; languor; headache; nausea; severe vomiting; thirst and constipation; intestinal paralysis; fetid "sewer-gas" breath; emaciation; prostration; tremblings; stupor; perhaps convulsions, coma, death. Duration 2 to 10 days or more. Recovery slow. Treat with antiseptics, stimulants, tonics, local heat, enemata; concentrated, nutritious food.]

FLUORAL (SODIUM FLUORID)

This is a white crystallizing powder. It has been taken, by mistake for starch, cream of tartar, certain laxative salts, and various similar appearing powder. It is a constituent of various vermin exterminators such as roach-food, etc. It has been found in some beverages. It produces a severe local irritation, also a general protoplasnuc, toxic effect. Weakness, various nervous protoplasnuc, such as chills, more or less paralysis especially of facial muscles, also aphonia, pain, vomiting, diarrhea, and more or less gastro-intestinal irritation. Summer cold.

Treatment: Free lavage, with lime water to make the Sodium salt insaliable and inactive. Also give emollients such as milk, for its calcium and as food.

FORMALDEHYDE— FORMALIN.

History:

*[Formaldehyde is a powerfully disinfectant gas. It is employed as a disinfectant for clothing, rooms, etc. Formalin is a 40 per cent. solution of gaseous Formaldehyde, and is used as an antiseptic and disinfectant in solutions ranging from 1 to 2,000 to 1 to 200. When swallowed it has a caustic effect.

* Author's uncondensed text.

Symptoms:

*[**From inhalation:**
Intense irritation of eyes and nose; dyspnœa, throbbing pain in head; sense of suffocation.

From swallowing a Formaldehyde solution (commonly a 4, 10, or 40 per cent. solution): Pain in stomach; nausea or vomiting; vomit may be bloody; dyspnœa; vertigo, intense anxiety; pulse rapid and small; urine suppressed; may be diarrhœa; coma; collapse.]

Treatment:

*[**When inhaled:**
Fresh air; gentle stimulation if necessary.

When swallowed:

1. Ammonia is considered the best antidote, forming a harmless hexamethylene amine. Three volumes of Spirit of Mindererus should be administered for every volume of 40 per cent. Formaldehyde solution which has been swallowed. An alkaline mineral water may then be given, to neutralize the Acetic Acid resulting from the reaction. In the absence of other agents, white of egg stirred up in water may be given and the stomach then washed out or evacuated by Apomorphine Hydrochlorate (in 1-10 gr. doses).
2. **Stimulate** with hypodermic injections of Strychnine, Digitalin, Aromatic Spirit of Ammonia, etc.
3. Gice demulcents as milk, barley water, etc.]

* Author's uncondensed text.

FOOD, POISONOUS; FOOD POISONING,

(Also see p. 199 and Part IV., p. 261, etc.)

Poisonous Cheese; Poisonous Fish; Poisoned or Poisonous Meat (as putrid meat). Oysters Milk. All protein food poison. (Also see p. 224*a*)

Fungi (such as Poisonous Mushrooms, Toadstools, Truffles, etc.). Also, Muscarine; Sausage Poison, and other varieties of Botulism, etc.

HISTORY AND SYMPTOMS

It is supposed that the symptoms of **food-poisoning** are due either to **toxins**, ptomains, a proteose, or to several causes combined. Phallin, a toxalbumin from Amanita Phalloides, breaks up red blood corpuscles. The only antidote is transfusing fresh blood or salt solution. Food poisoning is commonest from bacterial products, but there are other causes.

In a food poisoning the usual symptoms are those of a powerful gastro-intestinal irritant; and as a rule there is a 1 to 6 hour incubation period.

The specific symptoms, as commonly encountered are nausea, vomiting, abdominal pain and diarrhœa; there may be, also, more or less fever, rigors, headache, ocular disturbances, weakness and collapse.

In severe cases the following symptoms may appear: Nausea; sudden and severe retching; abdominal pain; dilated pupils; reddened or scarlatina-like skin; great thirst; very offensive diarrhœal discharges; elevated or reduced temperature; muscular twitchings; prostration and tendency to collapse; coma, perhaps death.

In poisoning by some food substances, such as cheese, the toxic agent may be a protein or proteose, and not a bacillus, or an alkaloidal or simliar substance. Therefore the symptoms may be different in some respects from those commonly exhibited in a food poisoning—as, there may be an obstinate constipation instead of diarrhœa, etc. (Proteose is described as a secondary protein derivative, resulting from further cleavage of the meta-protein molecule, one of the intermediate products of proteolysis beween protein and peptone.)

Poisonous Cheese, Milk, Ice Cream, or Curd, usually causes retching, vomiting, purging, abdominal pain, dyspnoea, dilated pupils, rapid pulse, and depression of temperature. Such poisoning is commonly believed to be due to the action of the butyric acid bacillus forming a toxic substance, a crystalline ptomain, called tyrotoxicon; but tyrotoxicon is not present in all poisonous cheese, etc. Apparently the tyrotoxicon found in the cheese in some of the poisonings was not an alkaloid, but resembled diazo benzene; but it seems certain that cheese poisoning, etc., like most forms of food poisoning, is quite frequently caused by powerful toxins produced by bacteria; and among the latter are specially virulent strains of bacillus coli, the bacillus enteritidis, bacillus botulinus, bacillus lactis aerogenes, some

of the proteus group, etc. It should be noted that poisonous cheese—for instance, a "Dutch Cheese"—may be normal in taste, odor, and appearance.

In **Ice Cream** poisonings the incubation period has been found to vary, being in many cases from 3 to 9 hours; sometimes to be delayed to 24 hours. (Also see Ptomains.)

Potato Poisoning: Potato poisoning is usually attributed to solanin which is present in unripe, germinated, or decomposed potatoes and in the berries; but the symptoms and findings have not always pointed to that substance. Sometimes the symptoms have been the usual symptoms of a food poisoning and apparently due to an infective soiling and bacterial activity, with headache, nausea, vomiting, diarrhœa, and debility. In some potato poisonings there have been severe abdominal pain—greatly increased by pressure—marked rectal and anal tenderness, obstinate constipation, almost complete suppression of urine, and partial collapse; no narcotic symptoms.

Poisonous Fish (such as craw-fish, land crab, yellow-billed sprat, dolphin, gray snapper, conger eel, mussel, smooth bottle-fish, grooper, rock-fish, Portugese man-of-war, king fish, porgie, fugu, old wife, blower, etc.) causes symptoms of severe irritation of the gastro-intestinal tract, somewhat resembling cholera morbus. Some fish are always poisonous, from gland secretions, sting or bite, etc.; others only in spawning season. Fish poisoning may also occur: from an idiosyncrasy; from a ptomatropinism from eating dried, etc., fish (such as sturgeon, etc.); or from the presence of bacteria and toxins in fish, especially in canned fish. A botulism may occur from eating bacillus-botulinus infected (hence, its soluble toxin changed), canned or other fish. In poisoning from canned fish, probably the infecting bacteria were present before the tin was sealed. In fish poisoning the symptoms may be severe intestinal and grave nervous disturbances, prostration, etc.

Shell-fish, such as oysters, clams, mussels, lobsters, cockles, etc., altho in good condition, may act upon some persons as a severe gastro-enteric irritant, producing more or less nausea, vomiting, abdominal pain, diarrhœa, dyspnoea, skin eruptions (urticaria—"hives," "nettle rash"), dilated pupils, etc. Tomato, vinegar, horse radish, mustard, etc., may also produce quite similar effects. Decomposed shell-fish may poison like decomposed meat. Oysters from oyster-beds polluted with typhoid germs may convey that disease. **Mussels** frequently produce very alarming symptoms: from having produced while alive a powerful toxin or leukomain called mytilotoxin, the action of which resembles that of Curarine; or, because of their having putrefied—but the toxin is not found in decayed mussels. The mytilotoxin type of symptoms commonly differs from that of the usual food poisoning. Usually there is no abdominal pain nor diarrhœa; but as a rule, there is nausea and vomiting, perhaps urticaria, pain in back, and dilated pupils. Mussels gathered from the bottom of a ship, in dock, are apt to be contaminated with Copper from the sheathing, or with Arsenic from the paint.

In lobster poisoning, pain, urticaria and eye symptoms may be absent. **Pickled or Tinned Salmon or Herring** sometimes produces poison symptoms. In some cases of poisoning by fish, the symptoms are those of simple irritation, such as nausea, vomiting, purging, cramps, depression, etc. In other cases, there are marked nervous symptoms, while symptoms of gastro-eneric irritation are slight. The chief nervous symptoms are delirium, weakness, thirst, sense of heat about head and eyes, dilated pupils, gradual insensibility, dyspnœa, coma, and convulsions. Sometimes an eruption appears resembling nettlerash and associated with asthmatic symptoms.

POISONOUS MEAT, MILK, ETC.

Poisoning by such food may be produced: By a botulism; by decomposed (putrefied, rotted) meat; or by meat from a sick animal, such as one sick with

peritonitis, metritis, puerperal or milk fever, foot and mouth disease, diarrhœal affections, or other diseases of a bacterial and putrefactive character—the true condition may not be indicated by appearance, smell, or taste of the food; by such germs in food as those of typhoid; by such specific disease of an animal, as tuberculosis, anthrax, etc.; by food infected with parasites, or their ova—as trichina; by meat unsanitarily exposed after preparation, etc.

The flesh of animals or of birds which have fed upon stramonium, laurel, or other poisonous plants or substances may produce the characteristic symptoms of poisoning by the respective poison; likewise the milk of such animals may produce them.

Honey may poison from the presence of bee-collected products of poisonous plants as in a carbohydrate or protein poisoning; or as a result of its acting as a gastro-intestinal irritant, producing urticaria, etc.

Putrid or decaying meat may produce symptoms of a gastro-enteric irritation; or of a typhoid character; of an atropin (ptomatropin) type; or of a true septicæmic type. (See Wounds, Poisonous.)

A true meat poisoning is caused, usually, by a ptomain or toxalbumin, or by bacteria belonging to the coli-typhosus group. The bacillus enteriditis of Gaertner, and similar organisms, or the bacillus botulinus are as a rule associated with such meat poisonings. In poisoning by meat or flesh containing the bacillus enteriditis or its toxin, the poisonous symptoms appear usually in six to twelve hours from the time the flesh was eaten. The chief symptoms are nausea, perhaps vomiting, diarrhœa—the stools being frequent and fetid; headache, vertigo, skin-rashes, debility and collapse.

In poisoning by meat or other flesh (especially by sausage) containing the bacillus botulinus (such poisoning being known as botulism or allantiasis) the symptoms are quite different, being of a neurotic type or character; the chief symptoms are dyspepsia, commonly a barking cough, dilated pupils, and a gradual emaciation, and progressive muscular par-

alysis. Altho the virulence of the enteriditis toxin does not seem to be reduced by cooking, smoking or pickling, that of the botulinus is destroyed at about 158° F.; but not by putrefaction or alimentary digestion.

Sausage Poisoning (Botulism—an intoxication not an infection), as previously indicated, may be caused by eating poisonous sausage or ham, whose poisonous condition is the result of the action of the bacillus botulinus. It is claimed that in uncured sausage-meat, a ptomain is sometimes developed which causes symptoms of sausage poisoning. Some observers have concluded that sausage poison is allied to the tetanus, diphtheria, and certain other toxins.

Serious illness, also, may be caused by eating sausage infected with trichina spiralis, a minute worm coiled up in an oval cyst. This is the most minute and numerous of the parasites. Its source is raw or imperfectly cooked pork or sausages. While enveloped in its capsule, the parasite is absolutely harmless. After entering the alimentary canal, it leaves its cyst and produces numerous young, which bore through the walls to the muscular tissues of the body, where they lodge in the muscular fibre-sheaths. Trichinæ produce malaise, anorexia, sleeplessness, fever, severe muscular pains, swelling of joints, sometimes contraction of flexor of extremities, œdema of face and eyelids, diarrhæa. Sometimes typhoid symptoms appear, and death in an unconscious state results. Death usually within 30 days. Chemical and microscopical examinations of the suspected food or of a portion of the subject's muscle should indicate the nature of the poison (p. 244).

Fungi: Various forms of fungi, such as mushrooms, toadstools, truffles, etc., are directly poisonous and produce symptoms of severe irritation of the gastro-intestinal tract. **Poisonous Mushrooms,** mistaken for edible varieties, or tried through ignorance of their possible poisonous properties, produce

such narcotic-irritant symptoms as violent vomiting, purging, anxiety, thirst, gastric and abdominal pain, delirium, stupor, etc.; perhaps suppression of urine and convulsions. The symptoms commonly occur within an hour, and death usually within 24 hours. The gills and spores of the mushroom should be sought for in the stomach contents.

Muscarine is a deadly alkaloid from various mushrooms—such as the Fly Fungus (Fly-Brown Agaric, False Orange). Fly Fungus is used in Kamchatka and Siberia to produce intoxication. Muscarine produces salivation; free perspiration; desire to urinate; violent colic, with thirst; slow, weak pulse; contracted pupils, dilating before death; dyspnœa; paralysis. Death from effect upon the heart; usually in 24 hours.

May often distinguish poisonous from non-poisonous mushrooms by the following: Gills of poisonous, usually white, cap often warty and stem hollow. Gills of non-poisonous, first pink, then brownish-purple; stalk commonly cylindrical and solid. Reject mushrooms which have white gills or milky juice, or in which the color changes when they are broken or cut.

Canned Fruits and Vegetables (a Botulism, etc.); Sometimes carelessly cleaned, unsound, improperly cooked, or imperfectly sealed canned fruits and vegetables may cause a severe food poisoning.

Occasionally the imperfect sealing causes a poisoning through a union of the malic or other acid of fruit juices with the metal used in canning.

Various strains of bacillus botulinus have been found in canned vegetables and fruits, which had caused food poisoning; but the germ is commoner in the home-canned than in the factory-canned foods; among such foods were home-canned string beans, corn, asparagus, peas, beans, ripe olives (preserved), home-canned apricots (with incubation 12 to 20 hrs., dysphagia, visual disturbances, etc.), salads, etc. It is said that by cooking canned olives in their preserving fluid for fifteen minutes, the bacillus botulinus will be

destroyed, if present. Usually such poisonous foods are offensive, but the heating will bring out any obscure odor of decomposition. Quite recently there have been outbreaks of botulism caused by the eating of poisoned (by bacillus botulinus and its toxin) spinach, although the spinach in some cases was apparently normal. The wise plan is to avoid the use of canned foods in which there is bulging or "swelling" of the ends of the can due to decomposition of the contents and the formation of gas, or in which the contents are at all offensive. Kempner has produced a helpful antitoxin for the toxin of bacillus botulinus; without serum treatment death in a day or two in about 1/3 of the cases.

Edible—Protein Anaphylaxis: Poisoning

*Some persons are unable to eat at all freely of certain common foods, without such producing food-rashes or other phenomena, more or less indicative of a poisonous action. This occurs in spite of their being fond of these foods, and of the good condition of the latter. There may be, either on occasion of special indulgence in certain food or foods, or, more or less frequently (almost daily and for weeks or months, or years), from frequent eating of some individually, but more or less unrecognizedly, unsuited food, such symptoms as the following: languor, headache, coated tongue, obstinate constipation and debility; perhaps some nausea, vomiting, sallowness of skin, and urticaria. There may be more or less frequent so-called "bad spells" (explosions), with these symptoms aggravated, especially the vomiting, debility, and headache. The condition may be the result of an excessive and prolonged or other injudicious use of the respective food or foods, or from some unknown cause. The condition and "spells" may well be regarded as more than simply an indigestion or an intestinal auto-intoxication; such may be interpreted as an idiosyncratic, cellular irritation, chiefly of proteid origin, and toxic character, resulting in a more or less constant disturbance of metabolism; characterized also by more or less cyclic exacerbations apparently occurring when the blood and liver become heavily charged with the toxic materials. The condition may be self-adjusting by production of an abundance of antibodies, producing immunity, but often is not. In an acute attack, treat as in Nos. 1, 2, 3, 4 of General Treatment, pages 149-150. The determination or identification of the actual and elementary, or fundamental agent or agents concerned in such condition is sometimes very difficult.

*Author's uncondensed text.

It may be one or more of various food-proteins, (also other proteins), either animal or vegetable or both. Frequently the offending food-protein or proteins may be determined by injecting into the skin of the patient (as in the Schick test), or vaccinating (as in the Von Pirquet test), or otherwise inoculating him with, as diagnostic tests, various protein extracts, one or more at a time, each having been carefully prepared from the protein of a different food. Also using, if indicated by asthma-like or catarrhal, etc., symptoms, protein extracts or solutions, prepared from the pollen of various non-edible plants, and even those prepared from the epidermis, hair-scales, feather-scales, or other scales, of various animals, birds, etc., suspected of having a poisonous effect upon the affected person, thru his inhalation, etc., of the respective protein poison. (See Proteins, Anim. & Veg., p. 224a.) Each disturbing protein is indicated as such, by its giving quite promptly a wheal-like, or other distinctive, cutaneous reaction, or inflammation, at the site of its introduction.

Over one hundred and fifty varieties of such test-substances from foods have been produced and marketed. Among these foods are wheat, oat, rye, barley, bean, beet, onion, potato, tomato, etc.; various fruits; beef, veal, lamb, mutton, chicken, goose, duck, eggs, etc.; such fish as pickerel, perch, bass, and other varieties; also various shell-fish, such as oyster, clam, lobster, mussel, etc.; nuts, etc. Corrective and curative measures for the recognized protein poisoning (a sensitized or anaphylactic—i. e., unprotected state or condition), are abstaining from food which contains the recognized poisonous protein or proteins; and avoiding the inhalation or other introduction of the recognized as thus injurious proteins; also, the establishment of a systemic immunity to the respective protein or proteins, by a protracted and graded vaccination of the individual with an extract or extracts of such, to produce gradually, sufficient anti-bodies, in such individual's blood and tissues, as shall be able to fully combat the poisonous effects of the respective

protein when it is taken into the body; i. e., to establish an immunity to that protein, or those proteins, in place of, or instead of, the existing sensitiveness to such. Several strengths of an attenuated or diluted extract or solution of the respective protein, is employed, usually (or several proteins may be thus or otherwise used), in gradually increasing doses and strengths, beginning with the weakest of the attenuations and therapeutically vaccinating, or inoculating, one to three times a week for a number of weeks, until the tendency to disturbance seems to be relieved and an immunity established.

(Regarding protein foods, it should be noted in this connection, that: pellagra—a serious disease supposed to be due to poverty, to eating diseased corn, etc.—has been found to be very commonly caused by living on foods deficient in protein of an animal origin; hence it is unwise to abstain from or to eat only a slight amount of such nutrient. Fat pork has very little of it, but other meats, milk, butter, cheese and eggs contain good percentages of animal protein. Milk is the best food for the prevention or cure of pellagra. A milk drinker and meat-eater can scarcely have the disease.)

GENERAL TREATMENT:

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. (In poisoning by fungi, wash out stomach with Pot. Permang. solution, 5 or more grains to the pint.) If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if not effective), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving an emetic, always give plenty of luke-warm water to encourage vomiting. **While syphoning or before producing vomit-**

ing, give, if at hand. **Tannic Acid or Gallic Acid** (30 grains in 2 tablespoonfuls of water), or charcoal freely or strong tea, or a decoction of oak bark (a teaspoonful to 2 wineglassfuls of hot water). **Then evacuate the stomach again,** unless vomiting continues. To relieve nausea after stomach has been emptied, give Lime Water and Creosote (put 2 drops of Creosote in a tablespoonful of Lime Water and give a teaspoonful of the mixture frequently).

2. **Give Castor Oil** (2 tablespoonfuls) and use an enema. **In poisoning by canned foods, fungi, and such, employ saline catharis, as by Epsom Salt** (2 tablespoonfuls in small cupful of water), or Glauber Salt (2 teaspoonfuls in 4 tablespoonfuls of water). For fungi, after purging, give vinegar in water.

3. **Stimulate.** If depression is very great, support heart with Nitroglycerin (in 1/100 grain doses), or stimulate with Brandy or Whisky (a teaspoonful dose by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ½ to 2 hours), or Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 20 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given.

4. **If body or feet are cold employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or

stove-lids, heated, applied to the feet and sides of the body). Also apply hot fomentations to the abdomen. In collapse, use sterilized salt solution (p. 118). Give oxygen if required.

5. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability. Also give **Tincture of Capsicum** (15 to 20 drops in ½ cupful of water). **Give** solution of **Ammonium Acetate** (in teaspoonful doses every ½ hour) to reduce fever and relieve kidneys.

Oil of Eucalyptus Globulus in 5 drop doses, is helpful in ptomain poisoning.

In fish poisoning, give Potassium Chlorate freely, or Spirit of Mindererus; also Capsicum. Use Chloroform, if required. Some avoid Calomel.

In poisoning by the Fungi give, as early as possible, **Atropine Sulphate,** hypoderm. (1/120 grain every ¼ to 2 hours) as a specific antagonist; or after stomach emptied. Tincture of Belladonna (20 drops in water every ½ to 2 hours by mouth) instead. **Atropine** exactly opposes **Muscarine.**

Antiseptics (such as Resorcin, Thymol, Salol, Naphthalin, Calomel or small doses of Bichloride of Mercury, and tonics are recommended for after-treatment in most food poisonings; also Potassium Permanganate (one grain, 4 times a day, in 4 ounces of water); Sodium Bicarbonate (one dram 4 times a day); and antitoxins.

There is no known remedy for trichinæ poisoning.

GASEOUS POISONS.

(IN GENERAL.)

BROMIDE (q. v.)
CARBON DIOXIDE (see Carbonic Acid Gas).
CARBON MONOXIDE (q. v.)
CHLORINE (q. v.)
FORMALDEHYDE (q. v.)
MURIATIC ACID FUMES.
NITROUS ACID FUMES.
HYDROFLUORIC ACID (q. v.)
HYDROGEN ANTIMONIDE (STIBIN).
HYDROGEN ARSENIDE (ARSENIURETTED HYDROGEN).
HYDROGEN SULPHIDE (q. v.)
NITROGEN MONOXIDE (NITROUS OXIDE). (See Anesthetics.)
PHOSPHINE (PHOSPHORETTED HYDROGEN). (See p. 100.)
SULPHUR DIOXIDE (SULPHUROUS OXIDE).

MIXED GASES.

AIR GAS (Air passed through mixture of hydrocarbons).
COMBUSTION, FIRE AND "FURNACE" GASES.
ILLUMINATING GAS (active ingredient, Carbon Monoxide) (Coal Gas—distilled from Coal; Water Gas—by steam passed through mixture of hydrocarbons; Acetylene Gas; Rock or Natural Gas), and **FUEL GAS.** (See p. 116-155.)
METHANE (MARSH GAS), **FIRE DAMP.**
OIL GAS, NAPHTHA GAS (are distilled from hydrocarbon oils).
SEWER GAS AND CESSPOOL EMANATIONS (q. v.)

GENERAL SYMPTOMS:

In a general sense, may say of gaseous poisons, that: they cause dizziness, headache, nausea, perhaps sense of suffocation, exhaustion, and collapse.

GENERAL TREATMENT:

Fresh air, Oxygen and Ammonia inhalations, cold douche to head and chest, saline solution (p. 118), stimulation, heat, friction, artificial respiration, rest.

GASEOUS POISONS IN WARFARE.

HISTORY, Etc.

There are three varieties of gas attack: 1. By Emanation. 2. By Drift Gas, Gas Cloud, or Gas Mist. 3. By Chemical Shells.

1. By Emanation: The emanation process consists in scattering chemicals about the trenches or other places which it is the intention to desert. When such chemicals are disturbed or dug up, or brought into contact with moisture, by the new occupants, a poisonous gas is produced. Calcium Arsenide, one of these chemicals, generates Arsene, a gas having faintly the odor of garlic.

2. By Drift Gas, Gas Cloud, or Gas Mist: For this purpose, gas is carried up to a front line or trench, compressed in steel cylinders (or tanks); the cylinders are dug in at the bottom of the trench and connected with pipes extending out over the parapet. When the valves of the cylinders are opened, the gas often escapes with a hissing sound which can be heard at some distance. The gas mixes with the air and is carried, by a suitable wind blowing toward the adversary, over the intervening ground and into his trenches and dug-outs, shelters, craters and hollows, but around eminences, perhaps even into his rear ranks and encampments. Sometimes the drifting is aided by blowing or pumping the gas. Usually the gas contains Chlorine as its chief constituent. It is heavier than air and drifts along close to the ground as a

dense bank, perhaps seven or eight feet high. A wind blowing from four to eight miles per hour best favors its transmission. A five-mile wind is the most effective of all. Watercourses and ponds do not obstruct the progress of the gas, and gentle rain has no apparent effect upon it; but strong rain washes it down. The color of the ordinary drift gas varies: in very dry air it is almost transparent and slightly greenish; in damp weather it has the appearance of a white cloud. It may be mixed with smoke of any color. The gas may be harmless after traveling five rods, or it may prove deadly for a distance of two miles or more from its source. As it advances it gradually becomes thinner, less deadly and ultimately innocuous by dispersion and dilution. It is said that gas-attacks have been made with wind velocities varying from three to twenty miles per hour (1½ to 10 yards per second) and over a front varying from one to five miles. In a nine-mile wind the gas would reach trenches one hundred yards distant, in twenty seconds. It has sometimes been found necessary for the adversary to wear protective helmets as far back as eight miles from the source of the gas.

The chief chemicals used in the drift, cloud or mist attacks have been Bromine, Chlorine and Phosgene (Phosgen—i. e., light producing, or light yielding. Composed of Carbonic Acid and Chlorine).

3. By Chemical Shells, and such other gas projectiles as hand grenades, trench mortar-bombs, etc.: The chemical shells commonly contain small quantities (usually about five pounds) of cloud or other gases in a liquid form. Among the poisonous gases used in shells are also Methyl Sulphate (of the Wood Alcohol group), Pelite [i. e., of a Petrol) (Gasoline), Petroleum, or fine mud (Pelos) source or character], also a gas having the irritant character of mustard; etc.

The "A" Tear Shells (Lacrimal, or Lachrymal Gas Shells, or "Weepers") of the Germans, were found to contain Bromacetone (Acetone—"An inflammable liquid, with a biting taste, obtained by the destructive distillation of Acetates and various organic compounds—used in making Chloroform and as a solvent for fats, Camphor and resins."

Regarding the tear gas, Xylol Bromide, it has been shown that man is more than one thousand times as susceptible to it as the horse and ten times as susceptible as the dog.

The "T" Shells of the Germans contained "Xylylbromide." (Xylyl, a radical from Xylene; the latter is a constituent of coal tar and of wood tar).

It is notable that of the so-called war gases many of them are liquids at ordinary pressures and temperatures. There are two general classes of such gases: The first class, the

lethal or deadly, consists mostly of those which kill by asphyxiation. The second class, the neutralizing, are not as poisonous as those of the first class, but have a more or less prolonged disabling effect. Among this class are the lachrymators (lacrimators) or tear gases, the sternutators or sneeze-producing gases, and also the eye, lung and skin irritants; the three latter varieties inflame the eyes, more or less seriously disturb respiration, or blister the skin.

The most effective gas employed during the World War was, from a military standpoint, the so-called mustard gas (dichloro-ethyl sulphide). It is not a gas but a liquid, and readily volatilizes. It is a heavy substance, its vapor being much heavier than air. It clings to trees, to the walls of buildings, and to the ground, and sinks into shell holes, trenches and other hollows or depressions.

In its liquid form, leather and ordinary clothing are readily penetrated by it. Government reports state that from four to twelve hours after being exposed to it, burns appear upon the skin. These burns are not readily healed. In its vaporous form it produces an inflammation of the eyes, resulting in temporary blindness; and it also attacks the throat and bronchial tubes, producing bronchitis or a broncho-pneumonia. "Mustard gas" is very active, and one part of it in 12,500,000 parts of air will inflame the eyes and quite disable, in the course of a few hours; although no truly specific remedy has been found for the burns it produces, nevertheless, it is claimed that the burns may be prevented by washing and scrubbing the skin, exposed to its effects, with kerosene, immediately after such exposure.

The Lacrimal Gas Shells may have little or no odor. They act directly upon the tear (lacrimal) glands of the eyes, producing a profuse secretion and flow of tears; this is accompanied by an intense smarting of the eyes, with consequent temporary blindness and inability to ward off or avoid bayonet, bomb, or other attacks. Strong concentrations of such gases also affect the lungs.

In gas projectiles, a large part of the possible explosive charge is replaced by a liquid which is converted into gas by the explosion. Usually, a large number of chemical shells are discharged into a small space, and after the explosion, the irritant chemicals form a small gas cloud; but some of the poison may sink to the ground and remain active for a long time. Gas shells are used most effectively when the wind is of low velocity or when there is a calm. Clumps of trees, clusters of buildings, etc., often retain the discharged gas, in an active state, for some time.

Arsine (arseniureted hydrogen gas) is a heavy, deadly gas which attacks the more important nerve centers and causes death in a very short time. There is no true antidote.

When very dilute, Chlorine may be recognized by its peculiar, Chloride-of-Lime-like smell, but stronger and more penetrating. Chlorine and Phosgene gases have a strongly corrosive action on metals, so that metal parts of arms must be well greased to protect them.

In shell gas, when the contents are released by the explosive charge, it expands in about the same ratio as water to steam. As the use of shells is independent of wind direction and they give no cloud-effect warning, but in large numbers are as deadly as clouds, they may be very destructively employed against distant ranks and rear artillery, as well as against approximate antagonists. In consequence, their use is becoming more common.

Phosgene and certain other gases strongly attack the mucous membrane of the respiratory organs, causing severe coughing. Exposure to such gas when it is highly concentrated, or long exposure to such when of low concentration, injures the tissues of the lungs, breathing becomes more and more difficult and distressing, until impossible, and death by suffocation ensues. Death may result from only two or three breaths of such gas. When present in sufficient quantities, Chlorine and Bromine kill by suffocation. Chlorine will cause paralysis of the glottis or windpipe valve when only one part of it is present in one thousand parts of air; and those affected by it will tear open their throats with their fingers in their frantic efforts to get air. In the much weaker proportion of one part of it in five thousand parts of air, death results from the acute inflammation of the lungs that the poison induces; agonizing death follows a frothy hemorrhage from the lungs after more or less prolonged suffering associated with the acute pulmonary inflammation. In one to fifty thousand parts, death occurs in a few days by gangrene of the lungs. The effects of Bromine are similar to those of Chlorine but more active.

Phosgene gas produces no effects immediately apparent. The person exposed to it may feel and act as usual for hours, then suddenly have a fatal collapse, apparently due to heart failure. Phosgene acts through its abstraction of lung moisture, etc.

The Anhydrides (chemical compounds derived from acids and other substances by abstracting a molecule of water from them) abstract moisture from the lungs upon entering them and revert, practically, to their former character, forming acids like their bases and act similarly.

Nearly or quite all of the asphyxiating warfare-gases produce, immediately or remotely, intense distress in breathing, or a severe irritation of the eyes, or both. Their use is sometimes concealed or otherwise aided by being associated with the use of smoke-clouds or smoke-shells.

Smoke screens to hide troops, or to conceal ships from submarines, etc., have been produced largely from phosphorus, but titanium tetrachlorid, sulphur dioxid and ammonia, zinc dust and carbon tetrachlorid, and silicon tetrachlorid have also been experimented with for screen purposes.

Prussic Acid gas is not much used; partly because it is too quickly fatal. Almost all of the other gases terrorize by the obviously agonizing distress they cause; and they reduce the number of combatants through the urgent efforts of the victim's companions to afford him immediate relief, in what appears to be a critical, perhaps only temporary disability. It has a direct action upon the nervous system. When it is in a concentrated form, inhalation of it is followed almost immediately by unconsciousness and death. When it is in the dilute form it produces dizziness, headache, pains in the chest and difficult respiration; these may be followed by coma, convulsions and death.

The following are the chief symptoms, as observed in the World War, in those affected by the suffocating gases to which reference has been made in the foregoing pages. (Those most familiar with such poisonings assert that they are, as a whole, essentially and practically Chlorine poisonings in character, effects and treatments.):

When a soldier is gassed to the point of collapse, he usually falls to the ground (where gas concentration and duration of exposure are the worst), gasping for breath and tearing at his throat with his fingers, almost blind and perhaps vomiting, his eyes smarting, and a burning feeling in his chest and a sensation as if it were in a vise. Death may take place immediately. (Usually those who thus died of suffocation had a greenish-yellow color after death.) Even some hours after being gassed, many victims are still choking, coughing up a green slime, making agonizing efforts to breathe, clutching at their throats and tearing open their clothes. At one moment they prop themselves up to gasp, and in another moment they fall back exhausted by their struggles. There is more or less headache and marked cyanosis, especially of the lips and ears; in some cases a light-yellowish frothy discharge escapes from the mouth and nose. Some, especially the older men, are in a state of almost uninterrupted collapse, with faces and hands of a leaden hue, and heads fallen forward on their chests; the majority of these do not recover nor rally. Usually all except those dying or collapsed are fully conscious and fighting desperately for life. The typical case is cold, with subnormal temperature, restless, conscious, with slow, full pulse, except in case of collapse. The face is more or less intensely cyanosed, and there is a trained, anxious expression. The posture is that of being propped up in bed or on stretcher, with head thrown back, and gasping for breath; some lie upon the side with

head over the edge of the bed or stretcher, endeavoring to aid expectoration of a frothy mucus, and distressed by a choking cough. The respirations are jerky and hurried, and may be forty per minute. With each inspiration the chest expands to its fullest extent.

Usually the person who has been gassed passes through three stages: First, the asphyxial stage (about 36 hours). Second, the quiescent or intermediate stage (about 12 hours). Third, the bronchitic stage. Some die in the third stage, the forthy secretion changing to a thick, greenish, muco-purulent expectoration; there is delirium, and the temperature may go up to 104° F.; the pulse is small and may run as high as 160 beats per minute; the respirations become less choking and gasping, but more shallow and a short time before death as high as 70 per minute. Death occurs from acute congestion and edema of the lungs.

The treatment in these poisonings aims to do three things: "First, to expel the excessive secretion. Second, to diminish the secretion. Third, to support the failing heart, and to oxygenate the blood." If possible the patient should be placed in the open air, or in an airy room; heat should be applied to the feet and body, he should be well wrapped up and given hot drinks. The most serviceable emetic is salt and water, in ten-ounce doses, followed by warm water given freely. Vomiting may be induced by tickling the back of the throat with a soft brush, or the patient should be encouraged to use his finger to vomit; usually the vomiting affords great relief, and brings away quantities of yellowish, frothy fluid. Very often the soldier, suddenly gassed, is fortunate enough to vomit profusely at once; this serves to clear out the deeper respiratory passages. If the gassed person is vomiting well, no efforts should be employed to increase the vomiting unless the respiratory passages become obstructed with the secretion; but if he has not vomited, he should be made to do so. The choking and gagging which occurs when the gassing takes place, accounts for the entrance of the gas into the stomach. Chlorine poisoning deaths are called "dry land drowning" because the deeper respiratory passages become filled up with serous transudation. Therefore the Schaefer method of artificial respiration is very beneficial in that and similar poisonings. Ammonium Carbonate in 10 to 15 grain doses. every three hours and, 10 to 15 minims of Wine of Ipecac with the same frequency, act as stimulating expectorants. Atropin is of minor value and if used should be given early. Some have favored prompt venesection, to unburden the venous circulation, while others are opposed to it.

Opium, best in form of the tincture in 5 to 15 minim doses, relieves the restlessness and allays the mental strain. Oxygen inhalations are helpful in marked cyanosis and dyspnea.

Desiccated Pituitary Body (Substance), (Posterior Lobe), hypodermically in half-grain doses, and Brandy, for failing heart and general circulation is recommended. Some give oxygen hypodermically. Warmth and much fresh air are of special importance. Not only is the quiescent period, in those who have been gassed, usually followed by a severe bronchitis, but they are quite apt to develop a gastritis and gastro-enteritis, characterized by furred tongue, loss of appetite, discomfort and burning in the gullet, tenderness over the stomach, recurrent vomiting, even of blood, from the stomach, bilious and bloody stools, diarrhoea and more or less jaundice; the liver may be enlarged, and albuminuria and hemoglobinuria present. Although the majority of those persons who have been gassed, even severely, recover, usually the recovery is slow and prolonged. Most of those who die, but not at once, succumb within 36 hours. In acute fatal cases, post mortem observations have shown: "An intense congestion of the entire respiratory tract, with bloody edema of a large portion of the lung tissue, and intervening small areas of acute emphysema."

The best preventive measures against gassing are the gas masks or helmets and respirators.

From U. S. Government reports it appears that the gas masks first used, by the U. S. soldiers in the World War, were such as were in use by the English. The wearer breathed through his mouth and the air was inhaled after it had passed through a box or canister which contained absorbents. The absorbent filling had been previously tested and proved to be effective in absorbing chlorine, phosgene and prussic acid. It was found that the rubberized cloth for the face piece must also be very impermeable to gases, and the canister filling material be made so hard that it would not break up into a fine powder, thereby clogging the canister and interfering with respiration. Chlorpicrin and other new gases were introduced by the Germans soon after the U. S. entered the war. The masks were found to be an inadequate protection and immediate efforts were instituted to meet the need. It having been found that charcoal was a good gas absorbent, various substances were carbonized in the effort to produce the most serviceable gas absorbing and neutralizing charcoal. Among the substances thus tried were various kinds of wood, nut shells, sea weed, ivory nuts, blood, lamp black, etc. The basis of most of the charcoal used was nut shells. It appears that hard, soda lime granules consisting of a mixture of caustic soda and calcium hydroxid was finally used to remove poisonous gases, or acid vapors, from the "ingoing air." To oxidize certain gases or vapors and to facilitate their absorption by the other substances in the filler, sodium permanganate was put in the mask. Dr. J. C. Frazer and other chemists developed an absorbent for gas masks to absorb carbon

monoxide. It is claimed that carbon monoxide gas can be continuously oxidized by the oxygen of the air in the presence of hopcalite (a mixture of the oxids of manganese, copper, cobalt and silver) in a gas mask.

"When the allied forces were caught in the first gas attack by the Germans, a few men recognized the chlorine gas." They knew that it has great affinity for moisture, and wet their handkerchiefs, coat sleeves or other pieces of cloth with water, or in the absence of such, even with urine, to breathe through; and they quickly passed the warning and advice along the lines, thus saving thousands of lives.

"The P. H. Helmet" considerably used in the World War, was thus described: "It consists of a double flannelette bag with two eyepieces and a mouthpiece, consisting of a hard tube on the inside, and a flat piece of rubber on the outside," through which the poisonous carbon, dioxide, etc., of natural respiration may be exhaled; this rubber remains collapsed when exhalation is not taking place through it. The flannelette is impregnated with solutions of phenol, caustic soda, hexamine (hexamethylenamine) and glycerine." It was claimed that the phenol was used to neutralize the chlorine gas, the caustic soda against the possibility of encountering prussic acid, and to neutralize the acid-producing gases. The hexamine was supposed to take out the phosgene; the glycerine to hold the chemicals in solution.

A common French type of anti-gas appliance was a mask which consisted of several layers of gauze, each saturated with chemicals, and so adapted as to fit under the chin, up the sides of the face, and across the forehead, and held in place by rubber bands. The goggles of these masks are made of cellulose acetate, which will not break or fog from the breath. The mask must so fit as to prevent air from entering the space in front of the face. Each man must be fitted and use his own mask.

The Box Respirator, commonly in use, consisted of a small canvas haversack, called a satchel, of two compartments, one of which contained the metal filter with its charcoal and sodium hyposulphite to absorb and neutralize the gas. The other, the mask, called the facepiece, was made of rubberized material, with mica eyeglasses, a nose clip (nose pincers), a rubber mouthpiece which was held in the teeth and which terminated on the outside of the facepiece in a flat, rubber exhaling valve, like that on the P. H. Helmet. Connecting the facepiece or mask and the metal filter, was a short length of non-collapsible tubing. The mask fitted the face closely and was held in place by broad elastic bands, passing around the head. Slight imperfections in helmets or respirators might easily permit of fatal results in gassing; hence, frequent inspections were made as to their condition. It was commonly asserted that a person in danger of gassing should learn to apply the mask or respirator in from four to six seconds.

Improved methods have been evolved for the removal of carbon dioxide, hydrogen and engine gases from the air within submarines.

GELSEMIUM (YELLOW JASMINE) — GELSEMINE — AESCULIN.

HISTORY:

Has been more or less used as a pain-killer and to produce abortion. Has also caused poisoning through taking by mistake.

Fatal dose: of the Fluid Extract (which is 4 times stronger than the Tincture) of Gelsemium 1 also 2 drachms. 35 drops of the Tincture have caused death in 1½ hours. A concentrated Tincture equivalent to 1/6 grain of Gelsemine caused death in 7½ hours. Death by paralysis of the respiratory centres.

SYMPTOMS:

Pain in brows and eyeballs: vision dim, sometimes double; pupils dilated; ptosis; dropping of jaw; sense of langour; drowsiness; great muscular relaxation; staggering; pulse rapid, feeble. skin cold, moist; face anxious; voice lost; pain in chest; respiration slow, labored; sensibility diminished; suffocation; spasm; foaming at mouth; coma.

TREATMENT:

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 or 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful

every 10 or 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting. Keep head up.

While syphoning, or before causing patient to vomit, give, if at hand and poison recently taken, **Tannic Acid or Gallic Acid** (30 grains in 2 tablespoonfuls of water), or liberal draughts of strong tea, or a decoction of oak bark (a teaspoonful to 2 wineglassfuls of hot water). Then evacuate the stomach again, unless vomiting continues.

2. **Give Castor Oil** (2 tablespoonfuls).

3. **Stimulate. [Atropine may hasten paralysis.** If give: Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ¼ to 2 hours).] Stimulate heart, circulation, and respiration with Brandy or Whisky (2 teaspoonfuls doses, by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently; also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ¼ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ¼ to 2 hours), or Digitalin (1/100 grain hypodermically, every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given.

4. **Morphine** is considered to be the most complete antagonist (give ¼ grain every ½ to 2 hours).

5. **Resort to electricity if necessary. Arouse by hot and cold water alternately douched on head and chest.**

6. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids heated, applied to the feet and sides of the body) to maintain bodily temperature. Employ friction.

7. **If respiration ceases** or is labored, resort to **artificial respiration** (rhythmically raise and lower the extended arms from the sides up to over head and back again 18 times a minute).

GOLD COMPOUNDS.

SYMPTOMS:

Irritant symptoms. It causes a pink stain upon the skin.

TREATMENT:

1. **Give Albumin** (white of egg) or flour (in water freely, and Sulphate of Iron (in 1 grain doses) promptly.

2. **Evacuate the stomach without delay** (either independent of or in conjunction with above) **if free vomiting has not already begun.** Syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

While syphoning, or before causing patient to vomit, give, if at hand and poison recently taken, **Tannic Acid or Gallic Acid** (30 grains in 2 tablespoonfuls of water), or liberal draughts of strong tea, or a decoction of oak bark (a teaspoonful to 2

wineglassfuls of water). Then evacuate the stomach again, unless vomiting continues.

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 20 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

GROUND GLASS.

Although not a poison, when given in food, kills by irritation—mechanical action. Treat by giving bread or mush freely; emetic; castor oil; demulcents; use counter irritation.

HYDROGEN SULPHIDE (SULPHURETTED HYDROGEN).

HISTORY:

A very active narcotic poison, but its characteristic offensive rotten-egg-like odor prevents frequent accident. May prove instantly fatal if inhaled pure; even when diluted, if breathed, causes prompt insen

sibility and even death; probably the result of rapid destruction of the blood corpuscles. Encountered by workmen in drains, sewers and cesspools. Usually, when encountered, is combined with other gases resulting from putrefaction of animal matter. The dark-brown or black color of the blood is due to the destruction of the blood corpuscles.

Death by asphyxia. Spectroscope shows sulph-meth-hemoglobin.

SYMPTOMS:

Breathed in a diluted state, it quickly produces unconsciousness and death. Persons remaining long in an atmosphere contaminated with this gas experience nausea, weakness and giddiness, loss of blood from mouth, pupils dilated and fixed, face livid, convulsions, coma.

TREATMENT:

1. **Take patient into open air**; or if possible, provide the patient with air containing **Chlorine Gas** to break up the Hydrogen Sulphide.

2. **Employ friction** of limbs and trunk.

3. **Apply heat to the body** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body to maintain bodily temperature.

4. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hy-

podermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

5. **For threatened death from embarrassed respiration, resort to artificial respiration** (rhythmically raising and lowering arms from straight at sides to up over head and back again, 18 to 20 times a minute).

HYDROPHOBIA.

(See Rabies Virus).

HYOSCYAMUS.

(See Belladonna).

ILLUMINATING GAS (COAL GAS, WATER GAS, ACETYLENE GAS), FUEL GAS, ROCK GAS—ETC.

HISTORY:

The facts stated regarding Carbonic Oxide apply in the main to Illuminating Gas; but the physiological effects of the latter are due to its displacing air, thus removing oxygen, and to the combined effect of this gas and heavier hydrocarbons. Poisoning has occurred from leakage of pipes in an adjoining room or from cellar or even a street main, the gas filtering in such case through the soil and perhaps so diluted as to be odorless, yet poisoning. The gas may be diffused through walls and partitions. Water Gas is more dangerous than Coal Gas.

GENERAL SYMPTOMS:

Headache; confusion; dizziness; nausea; uncertain gait; weakness; loss of memory; impaired respiration; perhaps convulsions; unconsciousness and death. If unconscious, patient may rouse up for a little while and seem intelligent, and then again become unconscious or have convulsions and die. Secondary Asphyxia and death may occur after apparently almost complete recovery.

The symptoms vary in poisoning by Illuminating Gas, according to whether they are those of true asphyxia (suffocation) or of slow Carbonic Oxide poisoning (by slow absorption).

Asphyxia, due to an overwhelming quantity of the Gas interrupting respiration and rapidly poisoning, exhibits such characteristic symptoms as choking, gasping, suffused eyes, congested face, cyanosis, collapse, coma, death.

Asphyxia by Illuminating Gas (true suffocation) is very different from a slow absorption—**poisoning** resulting from prolonged or irregular breathing of the diluted Gas.

Headache, dizziness, loss of appetite and malaise from slow poisoning from leaky pipes, etc., by small amounts of Gas, present in the air of rooms.

TREATMENT:

No true antidote known for poisoning by the Gas.

For true poisoning by the Gas, treat as for Carbon Monoxide (q. v.).

For suffocation by the Gas, fresh air inhalations and gentle stimulation. If necessary, artificial respiration. (See 1 and 4 under Carbon Monoxide).

INKS (See Appendix)

Treatment: According to chief toxic ingredient.

INSECT POWDER, POISONOUS.

Treat as in Arsenic Poisoning (q. v.).

For Dalmatian, Persian (Pyrethrum): Evacuate; free catharsis.]

INSECTS, POISONOUS. (See p. 244.) The bite or sting of bee, hornet, wasp, etc. Insect may inject formic acid to repel by irritation, or, to thin blood and keep it fluid to suck up.

SYMPTOMS:

Usually mainly local irritation. When by tarantula or scorpion may be serious and consist of: pain; swelling; fever; erysipelas; suppuration; gangrene; death.

TREATMENT:

In mild cases apply strong solution of Ammon. Chlor. strong soap-suds, or other alkali, or Tr. Iodine, to affected part. If stinger was left in, extract. Cold wet cloths, Camphorated Chloral, or Beta Naphthol Oint. (30 gr. to 1 oz.), for pain. Stimulate.*

*[To repel insects, apply kerosene, or oil of cedar, citronella, lavender (½ drachm, in alcohol—to saturation sol.), or pennyroyal; or in room, hang sweet clover. In severe cases treat as in snake bite. (q. v.)].

IODINE AND IODIDES.

HISTORY:

Iodine is sometimes taken by mistake for harmless mixtures or medicines. Rarely used for suicide or murder. 20 grs. caused death. Recovery has occurred after taking 1½ drachms. Death from 1 drachm **of Tincture.** Death usually occurs within 30 hours.

SYMPTOMS:

Pain in throat and stomach; metallic taste in mouth; salivation; great thirst; severe gastro-enteritis; vomiting; purging; **vomit yellow from Iodine, blue if farinaceous articles be present in stomach;** face deathly pale; urine entirely suppressed; giddiness; faintness; pulse rapid, feeble; high fever; pain in larynx; eyelids sometimes swollen; albuminuria; cyanosis; great excitement; convulsive movements; collapse.

TREATMENT:

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water containing egg and starch paste. If tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful, every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

Starch is the antidote to free Iodine forming Iodide of Starch. **Promptly and freely give large quantities of starch, wheat flour or arrow-root water** (water made by boiling starch in water or by pouring boiling water upon such), or give Sodium Thio-

sulphate (20 grains in 2 tablespoonfuls of water). The stomach must be evacuated soon after giving the antidote, as the compound is not altogether inactive. Sodium Bicarb. is antidotal in 2 dr. doses.

2. **Give demulcents** (such as white of egg, milk, oil, flaxseed or elm tea, barley water, gum arabic or oatmeal gruel, gelatin, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces. Give Castor Oil.

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically, every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

5. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum, 10 to 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically, every

½ to 2 hours), to relieve pain and nervous irritability.

IODOFORM—IODOL—ARISTOL.

HISTORY:

Iodoform taken by mistake or poisoning by absorption from surgical dressings. 4 drachms by mouth has been recovered from, but small doses have caused serious symptoms.; death from 30 grs.

GENERAL SYMPTOMS:

Drowsiness; slight delirium; emaciation; high temperature; rapid pulse; symptoms resemble meningitis.

TREATMENT:

1. **Wash the wound with the Oil of Eucalyptus.** [If the poison was swallowed evacuate the stomach.]

2. **Give stimulants if necessary.** Stimulate heart, circulation, and respiration with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically, every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically, every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for same purpose. Draughts of strong coffee may also be given. Give Potassium Bromide. Potassium Bicarbonate aids elimination.

IPECACUANHA.

SYMPTOMS:

Vomiting; hematemesis; hemoptysis.

TREATMENT:

1. **Wash out the stomach if possible.**

2. **Give vegetable acids,** such as vinegar and water (equal parts), Acetic Acid, diluted (a teaspoonful in ½ pint of water), Citric Acid or Tartaric Acid (½ to 2 drachms in a pint of water), or clear lemon juice, or orange juice, freely.

3. **Give stimulants if necessary.** Stimulate heart, circulation, and respiration with Brandy or Whisky (2 teaspoonful doses, by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically, every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically, every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given. Give Opium or Morphine for pain.

JABORANDI (PILOCARPUS) — PILOCARPINE.

HISTORY:

The dangerous dose of Pilocarpine is assumed to be 2 grains subcutaneously.

SYMPTOMS:

Profuse sweating; dizziness; salivation; vomiting; purging; tearing pain in eyeballs; contracted pupils; myopia.

TREATMENT:

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

While syphoning, or before causing patient to vomit, give, if at hand and poison recently taken, **Tannic Acid or Gallic Acid** (30 grains in 2 tablespoonfuls of water), or liberal draughts of strong tea, or a decoction of oak bark (a teaspoonful to 2 wineglassfuls of hot water). Then evacuate the stomach again, unless vomiting continues,

2. **Give Atropine Sulphate**—(1/100 grain antagonizes 1/6 grain of Pilocarpine)—(1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours by mouth). Very efficacious in arresting the symptoms.

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically, every 20 minutes until pupils are dilated), or Tincture of Belladonna (20 drops in water every 20 minutes until the pupils are dilated).

Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically, every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given.

4. **Morphine Sulphate** (¼ grain every ½ to 2 hours) to control nausea and vomiting.

JALAP.

SYMPTOMS:

Large, watery stools; tormina; tenesmus.

TREATMENT:

1. **Evacuate the stomach;** syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

2. **Give demulcents** (such as white of egg, milk, oil, flaxseed or elm tea, barley, gum arabic or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas) to soothe and protect the irritated or inflamed surfaces.

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful

doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically, every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically, every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically, every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given.

"KNOCK-OUT" DROPS.

(Commonly contain Chloral, with perhaps Opium, Hyoscyamus, Bromides or Cannabis Indica).

Treatment: Note symptoms as to predominant poison and treat accordingly (see such poison).

LABURNUM (THE SEEDS, WOOD, BARK, LEAVES, FLOWERS, PODS)—CYTISINE—ARNICA—GOLDEN ROD.

HISTORY:

All parts of Laburnum are poisonous, due to the presence of Cytisine, which is also contained in Arnica. Half an ounce of the Laburnum root has caused very serious symptoms.

SYMPTOMS:

Symptoms usually come on very rapidly; vomiting; purging; restlessness; drowsiness; twitchings; rigidity; convulsions; coma.

TREATMENT:

1. **Evacuate the stomach;** syphon out the stomach with a stomach-tube, using plenty of water. If the stomach-tube is not at hand, use an emetic, such

as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting. **Give Tannic Acid or Gallic Acid** (30 grains in a cupful of water, then 10 minutes afterwards again evacuate the stomach). If Tannic or Gallic Acid not convenient, give plenty of strong tea or a decoction of oak bark.

2. **Give Epsom Salt** (½ to 1 ounce—1 to 2 tablespoonfuls—in a teacupful of water), or Rochelle Salt (2 teaspoonfuls in a small cupful of water).

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ½ to 2 hours), and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 20 drops by mouth, or half as much hypodermically every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given (a pint by enema).

4. **Employ alternately, hot and cold douches** to the head and chest to arouse the patient.

LACTUCARIUM.

Symptoms somewhat similar to those of Opium, Treat as in Opium poisoning (q.v.).

LARKSPUR—STAVESACRE.

Symptoms are tetanic-like. Treat as for Nux Vomica poisoning (q. v.).

LAUREL: "Broad-Leaf," "Poison," "Mountain," "Wood," "Sheep," (etc.) Laurel. It poisons man and animals. Causes nausea, vomiting, dyspnea, dizziness, drowsiness, stupor. Treatment: Evacuate and stimulate, as in Laburnum.

LEAD AND ITS COMPOUNDS.

HISTORY:

Poisoning from Lead is usually by the Acetate ("Sugar of Lead"), sometimes by the Carbonate ("White Lead"), by Red Lead, or by Goulard's Extract. Sugar of Lead has been accidentally mixed with flour, in place of alum. White Lead has been mistaken for chalk, and Goulard's Extract for wine, resulting in poisoning.

1½ drachms of the basic Acetate has caused serious symptoms; an ounce of Sugar of Lead has been taken without fatal result; Goulard's Extract ¾ pint has been recovered from, also an ounce of White Lead; about 2½ drachms of the Carbonate of Lead caused the death of a child. Death in fatal cases is usually 3 or 4 days after the patient is prostrated.

SYMPTOMS:

Throat dry; great thirst; sweet, metallic taste in mouth; breath foetid; **colic, relieved by pressure;** abdominal muscles very rigid; cramps in legs; paralysis of extremities; vomited matters white; stools black (lead sulphide); sometimes constipation; rapid, tense, cord-like pulse, becoming weak and relaxed; anxious, pinched, livid face; vertigo; anesthesia; stupor; muscular twitching; convulsions; coma; death. Secondary effects may be atrophy of extensor muscles.

TREATMENT:

Give soluble sulphate, such as Magnesium or Sodium Sulphate, to form insoluble Lead Sulphate. With Magnesium Sulphate also give white of egg. Treat same as for poisoning by Barium compounds (q. v.). Morphine and Atropine for vomiting and colic; or Alum for colic. Put 1½ drachms Powdered Alum in pint boiling milk, separate curd, sweeten with sugar, give wineglassful every 1 or 2 hrs. Eliminate poison by Potassium Iodide (10 to 20 grains in water every 2 to 4 hours), which renders it soluble. Elimination takes place by bile, perspiration and urine. Also employ sulphur baths. Use electricity. Avoid carbonates.

LIME.

SYMPTOMS:

Burning pain in the abdomen; intense thirst; obstinate constipation.

TREATMENT:

1. **Give a vegetable acid**: lemon juice or orange juice freely; or Citric Acid (1 to 2 drachms to a pint of water), or Tartaric Acid (1 to 2 drachms to a pint of water), or Acetic Acid (a teaspoonful in ½ pint of water), or Vinegar (in ½ cupful doses, with water). The soluble sulphates, such as Magnesium or Sodium Sulphate (in 1 to 2 tablespoonful doses in water).

2. **Give demulcents** (such as white of 3 or 4 eggs, milk, oil, flaxseed or elm tea, barley water, gum arabic or starch water, oatmeal gruel, or even crushed bananas) to soothe and protect the irritated or inflamed surfaces.

3. **If pain is severe, give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth, or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

LOBELIA (LOBELIA INFLATA, INDIAN TOBACCO).

HISTORY:

A drachm of the powdered leaves is considered a fatal dose. Death in ½ to 4 days.

SYMPTOMS:

Violent vomiting; severe depression and prostration; sometimes violent purging; cold sweat; pale skin; feeble pulse; giddiness; tremors; sometimes burning pain in fauces and esophagus; convulsions; coma; collapse; death.

TREATMENT:

Keep in recumbent position, even after acute symptoms are relieved.

1. **Evacuate the stomach, if free vomiting has not already occurred,** i. e., syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective). After giving the emetic, give plenty of lukewarm water to encourage vomiting.

While syphoning, or before causing patient to vomit, give, if at hand and poison recently taken, **Tannic Acid or Gallic Acid** (30 grains in 2 tablespoonfuls of water), or liberal draughts of strong tea, or a decoction of oak bark (a teaspoonful to 2 wineglassfuls hot water). Then evacuate the stomach again, unless vomiting continues. **Caustic alkalies** decompose the poison.

2. **Give Castor Oil** (2 tablespoonfuls).

3. **Stimulate heart, circulation, and respiration** with Brandy or Whiskey (2 teaspoonful doses, by mouth every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine

Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically, every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ¼ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body) to maintain bodily temperature.

5. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth, or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

LOCO (Colorado Itch) — LOCO WEED (Crazy Weed)

HISTORY;

Poisonous, generally; and poison horses, cattle and sheep. Produce mania, erratic, grotesque movements, defective vision, progressive emaciation. Treatment: Emetics; cathartics; sedatives or narcotics as Chloral, Bromides, Opium, etc., with quiet surroundings; later stimulants, tonic, etc.

MAD-DOG-BITE (See p. 201).

MALE FERN.

Evacuation, stimulation, as in Lobelia. **Avoid oil.**

MERCURY AND ITS COMPOUNDS.

Bichloride of Mercury (Corrosive Sublimate)—Red Precipitate (Red Oxide of Mercury)—White Precipitate (Ammoniated Mercury)—Etc.

HISTORY:

Corrosive Sublimate has been dispensed for Calomel. It is used to kill insects and vermin, to preserve specimens, also to prevent dry rot in timber. Death may result from a lotion or ointment of it. Antiseptic solutions used for washing out cavities and as a surgical dressing may poison.

Fatal dose: White Precipitate has caused dangerous symptoms in 30 to 40 grain doses; 10 grains of the Cyanide of Mercury has caused death; Turpeth Mineral has been fatal in doses of 40 grains; 3 grains of Corrosive Sublimate has been fatal; but recovery from an ounce taken on a full stomach, free vomiting being promptly induced. The rubbing into the body of a salve of finely divided Mercury for the itch has caused death. Inhalations of Mercury poured on red hot coals has caused death. The fatal result may occur in ½ hour or be delayed to 2 weeks. An alcoholic solution of Corrosive Sublimate (80 grs. to ounce) applied to scalp for ring worm killed girl 9 yrs. of age. Death, usually mainly due to nephritis and uremia.

SYMPTOMS:

N. B.—**The following symptoms refer especially to Corrosive Sublimate,** but are in the main also characteristic of the others.

Severe gastro-enteritis; acrid, metallic, coppery taste in mouth; sense of constriction in throat; burning heat in esophagus and stomach; colicky pains; mucous, bilious, bloody vomiting; mucous, serous, bloody, straining stools; lips and tongue white and swollen, perhaps shriveled; breath fetid; pulse small, frequent, irregular; face swollen and flushed or anxious and pinched; extremities cold; convulsions; coma; collapse; death. Pain may be absent. Skin eruption (Eczema Mercurial) if symptoms are protracted. Secondary symptoms are coppery taste in mouth; foul breath; swollen, tender, dark-red colored gums; hectic fever; teeth sticky; tongue swollen and thickly furred; breath offensive; salivation. In salivation the saliva may be increased from a pint to 1½ pints in a day. There may be a mercurial tremor, and anuria.

TREATMENT:

1. **Promptly evacuate the stomach,** giving antidotal albumin in so doing or before. Syphon out the stomach with a stomach-tube, using albumen-water (white of one egg to a quart of water) or, a magnesia-water (Heavy Magnesium Oxide, a teaspoonful or more to a quart of water—add the Magnesia as a thin paste). While the lavage fluid is being prepared, administer if possible, the white of egg or other albuminous substance described below (see "2"). If stomach-tube is not available employ emetic instead such as Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective); or Syrup of Ipecac (2 teaspoonfuls every 10 minutes, 3 or 4 times if required to secure effect), or, Apomorphine Hydrochlorate (1/10 grain hypoderm., repeated in 15 minutes if necessary).

(1). "2." Stir up white of egg in water or milk (whites of 4 eggs to 1 pint) and give before or when begin to evacuate stomach. **In poisoning by Corrosive Sublimate, avoid excess of albumin, as the Albuminate of Mercury formed by the white of egg becomes soluble in an excess of the latter, also in the alkaline contents of the intestines, and may be absorbed. Give white of 1 egg for every 4 grains of Corrosive Sublimate taken. If eggs not at hand,** give finely chopped raw, lean meat, mixed up in milk or water; or wheat flour and milk, or Magnesia and milk. May mix flour in water and give, if eggs, meat or milk not at hand. After giving albumin, milk, or flour, again evacuate stomach; washing out thoroughly if possible. Give Magnesium Sulphate

(1 or 2 ozs. in 2 or 3 ozs. of water) by stomach-tube or as drink; and in 2 quarts of water may use it or use Fischer's solution as a helpful enema. May well give as cathartic Sodium Sulphate or Phosphate. Potassium Iodide (10 to 20 grains, in water, every 2 to 4 hrs., has been recommended.

Neutralizing the free acids of the stomach and secretions by lavaging the stomach 2 or 3 times a day with a weak solution of Sodium Bicarbonate (40 grains in 3 ozs. of water), or Sodium Carbonate (20 grs.), or Citrate (40 grs.), or other alkali, as in some other poisonings, is proving very helpful as a continuing treatment. Also the giving of Calcium Sulphid (5 gr. in 3 or 4 ounces of water 2 or 3 times a day), or Magnesia (½ to 1 dram in 3 or 4 ounces of water). Use mouth gargle of Hydrogen Perox.

Schisler and Brashear report great success by giving Magnesium Oxide 30 to 60 grains in water, every 3 or 4 hours; and with Sodium Bicarbonate used similarly. They maintain a salt-free diet and encourage free perspiration to aid elimination. Rosenbloom favors lavage of stomach with Calcium Sulphid, one grain to one ounce of water. He gives about 3 ounces of such solution by mouth for two days; and also gives a tablet of Sodium Phosphate 0.35 gram, and Sodium Acetate 0.24 gram, 3 times a day as an antidote. He uses Fischer's solution (Sodium Chlorid 14 gm., and Sodium Carbonate 20 gm., in 1,000 c.c. of water), intravenously; also washes out the stomach twice daily, giving immediately afterwards 5 grains of Calcium Sulphid in 3 ounces of water.

3. **Stimulate heart, circulation, and respiration**

with Aromatic Spirit of Ammonia, or Brandy or Whiskey; also with Strychnine Sulphate (1/60 to 1/20 grain, hypoderm., every ¼ to 2 hours). Atropine Sulphate (1/120 to 1/60 grain hypodermically, every ½ to 2 hours), or Tincture of Belladonna (5 to 10 drops in water every 2 to 6 hours) lessens the secretion in ptyalism. Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically, every ¼ to 1 hour), and inhalations of Amyl Nitrite (3 or 5 minim pearl crushed in handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used as stimulants. Draughts of strong coffee may also be given. **Also give demulcents.**

4. **Employ Artificial heat** [as in 4 of p. 168].

5. **Give Opium** (Powdered Opium, 1 or 2 grains every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth, or hypodermically, every ½ to 2 hours), to relieve pain and nervous irritability.

6. **Bismuth, Dilute Nitric Acid** in water, **or Tannin** as gargles and mouth washes for salivation.

The intravenous injection of 7½ grains of Calcium Sulphide in 7½ ounces of boiled and filtered water has been found beneficial. Also Fischer's, or normal salt solution.

[Some favor the following treatment, especially in cases seen early, in accordance with the Lambert and Paterson method:

Give whites of several eggs, then thorough lavage

of stomach; then introduce a pint of milk. If nausea persists repeat the lavage in an hour. When the stomach is quiet, give every other hour one-half pint of a mixture of sugar and Cream of Tartar each one dram, lemon juice one ounce, boiling water one pint. Every alternate hour give one-half pint of milk. Give Potassium Acetate solution, one dram to the pint, by colonic drip enteroclysis, continuously, to induce copious diuresis. Wash out the stomach and irrigate the colon, twice daily, to remove any of the poison being eliminated through these organs. Induce free perspiration by daily use of hot pack. The treatment should be continued until the urine examination, on two successive days, shows the poison is no longer present. For mild cases, a week's treatment may suffice. In cases where a large dose or a series of doses of the poison have been taken, or in which there was a previous kidney lesion or in which treatment has been delayed for one or more days, it may be necessary to continue it for as long as three weeks. If the treatment is delayed until anuria develops (usually on or by the fourth day), a favorable outcome is quite uncertain although urination be re-established.]

N. B.—Corrosive Sublimate is soluble in Alcohol and in Ether. Ether abstracts it from its solution in water.

NAPHTHALIN.

SYMPTOMS:

Depression; cyanosis; twitching; strangury; dark-brown changing to inky-black urine.

TREATMENT:

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, using plenty of water. If stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

2. **Give demulcents** (such as white of egg, milk. oil, flaxseed or elm tea, barley, gum arabic or starch water, oatmeal gruel, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces.

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

NICOTINE.

HISTORY:

A liquid alkaloid obtained from tobacco. Has been used for suicide and murder. Is a very deadly poison, death occurring in some instances in a few minutes.

The fatal dose of Nicotine for an adult not accustomed to tobacco is placed at about 1/10 of a drop. It is one of the most deadly poisons known, causing death in 3 minutes; but death has been delayed for hours. (See Tobacco).

NITROBENZENE (NITROBENZOL, ESSENCE OF MIRBANE, ARTIFICIAL OIL OF BITTER ALMONDS).

HISTORY:

A pale yellow oily fluid resembling in odor that of bitter almonds and because of its odor is added sometimes to sweetmeats, liqueurs or pomades. Its fumes, swallowing it, or only applying it to the skin, may poison. Workers in anilin dyes are exposed to danger from handling it. It is the solvent in many liquid shoe blackings and may poison by being absorbed. It is a powerful narcotic; effects similar to those of Prussic Acid. Death in hours or days.

Fatal Dose: 8 to 15 drops is considered a fatal dose; or merely tasting the fluid. Death from asphyxia.

SYMPTOMS:

The symptoms vary in character and may be strangely delayed for a day or two. Languor; numb feeling in head; confusion of mind; nausea; anxiety; cyanosis; dark nails, lips, tongue and mouth; dilated pupils; convulsions. **Coma.**

TREATMENT:

When swallowed.

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If

the stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

Then give **Ammonium Carbonate** (2 to 10 grain doses every 2 to 4 hours in much water), or Spirit of Mindererus (½ to 1 tablespoonful in water every 2 to 4 hours), or

2. **Stimulate heart, circulation and respiration** with Aqua Ammonia (½ teaspoonful in a cupful of water), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently), or with Chloric Ether (½ teaspoonful in water every 15 to 30 minutes), or give these as enema; also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically, every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ¼ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically, every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), or inhalations of Ammonia may be given for the same purposes. Draughts of strong coffee may also be given. The transfusion of a normal saline solution (2¼ level teaspoonfuls of salt to 1 quart of water, used at 110° F.) may prove serviceable. [Blood is thick and brown.] Avoid alcohol by stomach as favors absorption.

3. **Employ alternate hot and cold douche to** chest, pouring from a height. Rub body.

4. **Employ artificial respiration** if necessary (by rhythmically raising arms extended at sides to up over head and back 18 times a minute) until recovery results or cardiac pulsation is lost.

5. **Give oxygen.** Use normal salt solutions per rectum. Chloroform for excitement.

6. **Employ interrupted current of electricity** over heart region and to chest walls. Flagellate.

When inhaled: omit No. 1.

NITRIC ACID.

(See Acids, Mineral.)

NITRITES.

(See Amyl Nitrite.)

NITROGLYCERINE.

HISTORY:

Is used as a remedy for neuralgia, angina pectoris, and various cardiac affections; has been taken by mistake for a beverage.

Fatal dose: two mouthfuls of crude Nitroglycerine caused death; 1/50 m. severe headache.

SYMPTOMS:

Throbbing headache, increased by motion; "queer" feeling in head; pulsation all over body, even to the tips of the fingers; mental confusion; giddiness; sense of constriction in throat; irregular pulse; muscular weakness; precordial pain; dilated pupils; flushed face; anxiety; scanty, pigmented urine; sudden collapse; sometimes nausea and loss of consciousness; also symptoms characteristic of the Nitrites.

TREATMENT:

Emetics and cathartics. Recumbent position. Apply to head, cloths containing ice or wrung out in ice water. Give Brandy (1 to 4 teaspoonful doses). Give Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically, every ½, to 2 hours), or Tincture of Belladonna (20 drops in

water every ¼ to 2 hours). As a rule the Belladonna relieves the headache. Also give Fluid Extract of Ergot (¼ to 1 teaspoonful in water, repeated in 15 to 30 minutes, by mouth, or half as much, or a grain of Ergotin, hypodermically). Also coffee for headache.

NITROUS OXIDE.
(See Anesthetics).

OILS, VOLATILE.
(See p. 222).

NUX VOMICA (STRYCHNOS NUX VOMICA, POISON NUT, QUAKER BUTTONS, RAT'S BANE) — STRYCHNOS IGNATII — STRYCHNINE — BRUCINE.

HISTORY:

Poisoning may result from swallowing a vermin killer containing meal or flour with strychnine, and perhaps arsenic also. Game killed with Strychnine may poison. The drug is used for both suicide and murder. It has been taken by mistake for Santonine, for Salicin, etc. Brucine may be physiologically considered a dilute Strychnine.

Fatal dose: Powdered Nux Vomica, 30 grains. (One seed weighs about 30 grains—sufficient quantity to cause death). Extract of Nux Vomica, 3 grains. Death may occur from Nux Vomica in from 15 minutes to 12 hours. Three grains of Strychnine are usually fatal, and 1/6 of a grain has caused death; 1/16 of a grain hypodermically has produced alarming symptoms. It is probable that 7/10 of a grain hypodermically would produce death; 1/16 of a grain by mouth killed a child 2 years old in 4 hours; a recovery in an adult from 20 grains after prompt emetic; Dr. Warner died in 20 minutes from ½ grain (likely to kill), taken by mistake.

Death or recovery is usually speedy. There is hope of recovery if the patient lives over 5 or 6 hours. Fatal results have occurred in 5 minutes.

There was death after 6 hours in a case where 6 grains of Strychnine were given with some Morphine. Average fatal dose Strychnine about 1½ gr. Death in 1¾ hrs. from ¼ grain. Recovery from 40 grs.

Death, from suffocation or exhaustion, usually in about 1 or 2 hours from beginning of symptoms.

The taste of Strychnine is intensely bitter and a dilution of 1 part in 100,000 may still be recognized by its bitter taste.

SYMPTOMS:

A sense of suffocation and difficulty in breathing; sudden muscular rigidity; stiffness about the neck; uneasy startings and sense of impending death, followed by tetanic convulsions, which come on in paroxysms varying in intervals from 3 to 30 minutes; lasting from 1 to 5 minutes or longer; opisthotonos; limbs rigid, head bent back, body stiffened and arched, resting on head and heels, with everted feet, during paroxysm—sometimes the arching is forward and sometimes it is sideways; convulsions produced by a slight touch, breath of air, or noise; between convulsions a complete relaxation; face dusky from difficulty in breathing; eyeballs prominent and pupils dilated during paroxysm; lips livid; a peculiar grin (risus sardonicus), corners of mouth drawn back; eyes fixed, widely opened; great thirst but inability to drink from spasms of jaws; respiration suspended during convulsion, patient quite conscious; often great anxiety; sometimes convulsive screams; cramp-like muscular contractions; pulse feeble and very rapid during paroxysm; involuntary defecation and urination; lock-jaw late in poisoning; death. (Distinguish from idiopathic or traumatic tetanus).

TREATMENT:

N. B. — Put patient in horizontal position in a dark room, free from all noise.

1. Give animal charcoal (ad libitum), or Tannic Acid (30 grains in a small wineglassful of water),

which forms a very insoluble tannate; or Iodine (1 to 2 grains) and Potassium Iodide (5 to 10 grains) in water (a small wineglassful), or strong tea, or a decoction of oak bark (½ ounce to a gill of water); or, Tr. Iodine, ½ dr. doses; follow by syphonage, the stomach-pump, or an emetic if spasms have not set in.

Potassium Permanganate (in 10 grain doses in a pint of water and repeated in 2 hours) is said to be a good antidote. Also Iodide of Starch.

2. **Evacuate the stomach** QUICKLY: Syphon out the stomach repeatedly with warm water, using a stomach-tube and gag. If tube is not at hand, use the stomach-pump, or give an emetic, such as Zinc Sulphate 20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty lukewarm water to encourage vomiting. **After tetanic symptoms have begun, avoid using stomach-tube or an emetic until the paroxysms have been controlled. In syphoning use Chloroform inhalations.**

3. **Give Spirit of Nitrous Ether** (a teaspoonful). **Catheterize frequently** to prevent reabsorption.

4. **Give inhalations of Chloroform or Ether to control the spasms; or give Chloral** (20 to 30 grains in water by mouth or twice as much by rectum, every ½ to 2 hours), or **Potassium Bromide** (1 to 2 drachms in water every ¼ to 1 hour by mouth, or 1½ to 2 drachms by rectum), not both Chloral and Bromide. Keep patient gently narcotized during several hours if necessary. Give Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tr. Belladonna in 20 drop doses every ¼ to 2 hours. Inhalations of Amyl Nitrite (3 or 5 minim pearl crushed

in handkerchief and inhaled, using one every 10 to 15 minutes if necessary), Curare (in 1/20 to 1/6 grain doses hypodermically), Calabar Bean (in form of Physostigmine Sulphate, 1/100 to 1/50 grain every ¼ to 2 hours), Paraldehyde (½ to 1 teaspoonful in sweetened water every ½ to 2 hours) and Urethane (in 5 to 30 grain doses in water every ½ to 1 hour) also highly recommended. **Strong tea relieves thirst.**

Important! For threatened death from embarrassed respiration, should promptly resort to artificial respiration (rhythmically raise and lower arms from extended position at sides to up over head and back again, 20 times a minute), if possible.

OPIUM — LAUDANUM — CODEINE — MORPHINE, HEROIN — NARCEINE — POPPY — LACTUCARIUM — DIONIN — ETC.

HISTORY:

Poisoning has resulted from an infusion or decoction of seeds, capsules or leaves of the poppy, also the blossoms and fruit of the red poppy, also from the official and other preparations of Opium. Poisoning has resulted from enemata, lotions, poultices, and suppositories containing Opium or its preparations. Children are very susceptible to Opium and its preparations. "Godfrey's Cordial," "Dalby's Carminative," "Battley's Solution" and "Black Drop" may be classed under Opium and its preparations. Opium is quite often employed for the commission of suicide, also of murder.

Fatal dose: 4 grains is the smallest fatal dose of Opium recorded, but 360 grains have been recovered from; Laudanum, 1 drachm; Extract of Opium, 2½ grains (equal to 5 grains of Opium); Morphine from 1 to 4 grains. Fatal results from 1/6 to ½ of a grain of Morphine subcutaneously. Recovery from even 4 or 5 ounces of Laudanum; also from 2 drachms of Morphine. Infants have died from such small doses as 1/90, 1/15 and ⅛ of a grain of Opium, or 2 or 3 drops of Laudanum; 1 drop equiv-

alent to about 1/12 grain of Opium, killed an infant 7 days old; 2 grains of Morphine Acetate subcutaneously injected in a man with rabies produced but little effect. Tetanus, Strychnine, convulsions, great pain, or Opium habit, make nervous system very tolerant of Opium. De Quincey used 9 ounces of Laudanum daily (equal to 360 grains of solid Opium). Death has occurred from Morphine applied to an abraded surface.

In Opium poisoning, death usually occurs in from 7 to 12 hours. Shortest period recorded is ¾ of an hour; the longest 4 days. If patient survives 12 hours, chances of recovery are good. Patient considered comparatively safe when respirations stay above 10 per minute.

The symptoms of Morphine poisoning appear in from ¼ to 1 hour, and a fatal result may occur in ¾ of an hour, but as a rule not until 6 to 24 hours after the poison was taken.

Opium makes whites and Chinese sleepy; said to cause homicidal mania in Japanese and Malays.

SYMPTOMS:

Mental excitement; increased heart action; headache; weariness; weight in limbs; drowsiness; diminished sensibility, then deep sleep; contracted pupils (perhaps to a pin point); then face becomes reddened, suffused, or bluish; consciousness entirely lost; at first difficult, later impossible, to arouse patient; reflexes lost; jaw falls; cyanosis; respiration stertorous and puffing, shallow, slow, difficult, irregular; muscular relaxation; cold, clammy sweat; pulse rapid, weak, compressible; coma; death. Early vomiting and free perspiration are favorable symptoms. Prognosis is less favorable the more strongly the pupils are contracted. A small fatal dose usually produces narcosis, but a very large one often causes severe convulsions.

[In conjunction with the preceding symptoms investigate the history of the case; notice the odor of the breath and of the vomited matter, and examine the urine for Morphine. Remember Alcohol and Opium in some form frequently are taken

together. See if pupils are normal or dilated and conjunctiva congested as occurs in alcoholism, or if the pupils are contracted and insensible to light as occurs in Opium poisoning, or unequal as in apoplexy. In apoplexy, paralysis of facial muscles or limbs and the cardiac and vascular condition aids in the diagnosis. In Chloroform or Ether poisoning the vomited matter or breath usually reveals the poison by the odor; and in poisoning by drinking Chloroform is death-like aspect of face and widely dilated pupils. In uræmic poisoning, the history of the case, examination of the urine and equal pupils (dilated or normal, with puffy eyelids), indicate the poisoning. In diabetic coma, the characteristic apple or pear odor may be detected on the breath, and sugar found in the urine.] Differentiate from hemorrhage into pons with contracted pupils.

TREATMENT:

Immediately resort to artificial respiration and stimulation in the most urgent cases. (See p. 89.)

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains, or Syrup of Ipecac, a teaspoonful, every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, every 15 minutes until effective), if narcosis has not set in. After emetic, give water to encourage vomiting. Thoroughly wash out stomach. (Morphine given hypodermically, enters stomach)

While syphoning the stomach, or when giving emetic, or even before, give Potassium Permanganate (10 grains in a pint of water, repeated in ½ hour; or as much as of Morphine taken, and repeat every ½ hour 3 or 4 times), to oxidize the poi-

son. This drug has seemingly proved effective even when Morphine had been taken hypodermically. It is said that 6 grains of the Permanganate will neutralize an ounce of Laudanum. It has been proposed to add 2 teaspoonfuls of Dilute Acetic Acid or of White Vinegar to the antidote to change the Morphine into a soluble salt. Irrigate colon, high up.

The hypodermic injection of Potassium Permanganate solution is believed to have proved beneficial in some cases. (Inject 15 minims of a grain to the ½ ounce solution every 15 minutes.)

When Potassium Permanganate has been introduced into the stomach in treatment, it should afterwards be removed by syphon or emetic. If Potassium Permanganate is not at hand, give Tannic Acid (30 grains in a wineglassful of water), or Gallic Acid (the same amount), or copious draughts of strong tea, to make all the alkaloids insoluble. Animal Charcoal (a tablespoonful or more, preferably dry) may be given to precipitate or absorb the alkaloids. When the stomach has been evacuated well introduce a pint of hot, strong coffee and leave it there.

2. **Administer Atropine Sulphate,** hypodermically (1/120 to 1/90 grain every 15 minutes, 3 times, or until respirations number 8 per minute), or Tincture of Belladonna by mouth or hypodermically (10 to 20 drops in water every 15 to 30 minutes, 2 or 3 times). It is said that 1/20 grain of Atropine will antagonize 1 grain of Morphine, and 2 to 3 drachms of Laudanum. **Atropine or Belladonna should be given very cautiously in this kind of poisoning and not until the pupils dilate (therefore not depending upon such effect as a guide), lest poisoning by either result.—guide is better respirations.**

3. Arouse patient with inhalations of Ammonia Water or smelling salts cautiously employed.

4. **The patient should be further aroused and kept awake** by means of shaking, pinching, slapping with a wet towel, dashing cold water on face and chest, or alternate hot and cold, over his head from a height frequently repeated. drying patient in the

intervals. Avoid applying so much cold water as to cause collapse. Alternately hot water and ice to the nape of the neck helps. Walking between attendants often helps to arouse and stimulates lagging circulation, but **avoid walking patient so much as to use up vitality. Arouses to flagellate soles of feet.**

Tincture of Capsicum (1 to 2 tablespoonfuls in water) by rectal injection sometimes almost instantly relieves the stupor. **Lemon** or **Orange Juice,** or **Cream of Tartar in water,** every 10 minutes, antagonizes the narcotism. Avoid vinegar and Acetic Acid.

5. **Oxygen inhalations** are frequently of great value; also **faradization of chest muscles** (anode placed over root of phrenic nerve, cathode 3 inches below ensiform cartilage), or of the extremities.

6. **Stimulate heart, circulation, and respiration** with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ¼ to 2 hours), or Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ¼ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour). Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), are highly recommended for the same purposes. Plenty of strong **coffee** may well be given frequently by mouth, but an enema of a pint, introduced hot, is often very beneficial. (Although Brandy, Whisky, Ether or Camphor hypodermically are sometimes resorted to for failing circulation and respiration, as a rule it is better to avoid their use, owing to their effects upon the brain, etc.) May use Cocaine(¼ gr. hypoderm.)

7. **Give Sweet Spirit of Nitre** (1 teaspoonful in a wineglassful of water every ½ hour) to aid elimination of the poison by the kidneys. Evacuate the bladder frequently to prevent reabsorption of the poison. Pilocarpine aids elimination.

8. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated

applied to feet and sides of body), to maintain bodily temperature. Employ: friction, heart massage.

9. **Resort to artificial respiration** (raise extended arms from sides to up over the head and back again 18 times a minute) if breathing stops or becomes very labored. Should be kept up for 2 hours if in doubt. Normal salt solution, may help. (See p. 118.)

PARALDEHYDE.

HISTORY:

Has been recommended as a substitute for Chloral. Odor of drug in breath and urine.

Fatal dose: 1 drachm has produced serious symptoms. Recovery from 3½ ounces. Unconsciousness may last for more than 30 hours. Death by paralysis of respiratory centres.

SYMPTOMS:

Slight stimulation; excited; incoherent; muscular relaxation; rapid pulse; pupils contracted and insensible to light; insensibility; collapse.

TREATMENT:

1. **Evacuate the stomach;** syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains, or Syrup of Ipecac, a teaspoonful, every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

2. **Give Atropine** (1/120 grain hypodermically every ¼ to 1 hour, 2 or 3 times), or Tincture of

Belladonna (10 to 15 drops every ¼ to 1 hour, for 2 or 3 doses), or Strychnine Sulphate (1/60 to 1/20 grain doses hypodermically every ½ to 2 hours). Employ electric battery if necessary.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body).

4. **Oxygen. If required, artificial respiration.**

PETROLEUM (CRUDE MINERAL OIL OR ROCK OIL)—PARAFFIN OILS—KEROSENE (MINERAL OIL, COAL OIL)—GASOLINE (PETROL—BENZINE)—NAPHTHA—RHIGOLENE—ETC.

HISTORY:

Petroleum or the products of its distillation have been drunk accidentally for ginger beer and other beverages with serious results. 3 ounces of Naphtha (the kind usually burned in lamps) killed a boy 12 years of age. Recovery after swallowing a pint of Petroleum and ½ pint of Kerosene. Poisoning easily recognized from smell of breath and vomited matters. The prognosis is good.

[The inhaling of Gasoline fumes or gases of its combustion, particularly in an enclosed space such as a garage, has proved very dangerous and sometimes suddenly fatal, through the production, it is claimed, of Carbon Monoxide, Methane, acetylene, etc. The free use of Gasoline as a wash may cause dysphagia, headache, cyanosis, coma, perhaps death; mania may occur during a recovery. Treat these forms of Gasoline poisoning as in poisoning by Carbon Monoxide, but stimulate cautiously.]

SYMPTOMS:

When kerosene or gasoline **swallowed**: Severe burning in mouth and stomach; vomiting; stools covered with oily layer; cold skin; feeble pulse; sighing respiration; pale, anxious face; great thirst and restlessness at night; unconsciousness.

If gasoline **inhaled**: Giddiness, feeling as if contraction of head, headache followed by partial or

complete insensibility, flushing or facial cyanosis; a maniacal tendency while returning to consciousness. Facial cyanosis greater from inhaling vapor of raw or unburned gasoline than from fumes or gases of imperfectly consumed, carbonized gasoline.

TREATMENT:

1. **If poison inhaled:** Place patient in fresh air. **If swallowed: Evacuate the stomach:** Syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, give an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains, or Syrup of Ipecac, a teaspoonful, every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

2. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given, and friction of the skin resorted to.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

4. **Resort to artificial respiration** (raise extended arms from sides to up over head and back again 18 times a minute), if breathing stops or becomes very labored. Should be kept up for 2 hours if in doubt.

5. **When Swallowed.—If pain is severe, give Opium** (Powdered Opium, 1 or 2 grains every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth, or hypodermically, every ½ to 2 hours), to relieve pain and nervous irritability.

PHENACETIN.

(See Acetanilid).

PHENOLS.

(Acid Carbolic, etc.)

PHOSPHORUS—"RATSBANE"—"RAT POISON"—MATCHES.

HISTORY:

Yellow (common) Phosphorus is poisonous, luminous, and evolves a strong odor. Red Phosphorus is not poisonous, not luminous, and almost odorless. The former is used in rat-poison and both kinds for the ends of matches. Old style matches are tipped with Yellow (waxy) Phosphorus mixed with Potassium Chlorate, sand, and glue. "Safety" matches are tipped only with Potassium Chlorate and Antimony Sulphide; Red Phosphorus and sizing on the containing box, for lighting. The ordinary Phosphorus rat-paste consists of Phosphorus, fat and sugar; some also contain Prussian blue as a coloring matter; others contain Arsenic as well as Phosphorus, and a common rat-paste is said to have ground glass for one of its constituents. Some vermin killers contain Strychnine.

Fatal dose: 1½ grains of Phosphorus; 1/9 grain has caused death. The chewing of two

matches killed a child. Recovery after sucking 300 matches. 1/50 grain of Phosphorus killed a child; 1½ grains killed a man, and ⅛ grain, a woman, inside of 12 hours. A child recovered after swallowing a drachm of rat-poison. Death occurs in from ½ hour to 12 days; usually between the third and seventh days. Recovery is rare. Death results from failure of circulation and respiration. Death frequently takes place suddenly. Phosphorus is more likely to cause death if finely divided or in solution than if taken in solid form.

SYMPTOMS:

The symptoms may appear in an hour or not until 3 or 4 days after the poison has been taken.

Breath smells of Phosphorus—is garlicky; Phosphorus or garlic taste in mouth; eructation of Phosphorus vapors and may be Phosphorus odor in breath; burning pain in esophagus, stomach and abdomen; inflammation of stomach and intestines; mucus, bile and blood vomited and are luminous in the dark; there may be purging or constipation; may be bloody, coffee-grounds vomit with suppression of bile; jaundice, perhaps with nettle-rash; pain in region of and liver enlarged; pupils usually dilated; temperature low; abdomen distended; twitchings; headache; vertigo; delirium; tendency to hemorrhage; albuminous, scanty urine; convulsions; coma; pseudo-menstrual discharge, abortion or miscarriage in women. The general symptoms are similar to yellow atrophy of the liver. (Degeneration of liver and kidneys may finally result and ultimately cause death.)

TREATMENT:

Avoid ordinary oils and fats and substances containing them, such as milk, as they increase solution and absorption of the Phosphorus. Liquid petrolatum has been given successfully on account of its being physiologically inert, as it envelops the poison and delays its absorption. It should be followed by lavage, in which this oil may also be used. There is no known chemical antidote.

1. **Evacuate the stomach** by syphoning it out with a stomach-tube, using also, if possible, water, into which a teaspoonful of **old Oil of Turpentine** has been put. Wash thoroughly. If a stomach-tube is not at hand, may use a stomach-pump or give an emetic of Copper Sulphate (3 or 5 grains in 2 tablespoonfuls of water every 5 to 10 minutes until vomiting results). Then continue the Copper Sulphate in 1 grain doses every 15 minutes for 2 or 3 more doses. Copper Sulphate is the best emetic, inasmuch as it is believed to have some antidotal action by forming a less soluble phosphide; it is supposed to coat the particles of Phosphorus, primarily with a layer of Copper Phosphide, secondarily with Copper itself, thus preventing the solution of the Phosphorus particles in the stomach fluids.

If Sulphate of Copper is not at hand, use Zinc Sulphate (20 grains in 2 tablespoonfuls of water), or Mustard (a tablespoonful to 2 of water), may be given. [Recto-colonic irrigation later on.]

2. **Give without delay old, resinified Oil of Turpentine, or better still, French Oil of Turpentine** (½ teaspoonful or more, floated on hot water or in capsules, and repeat 3 or 4 times, at 15 to 30 minute intervals. Avoid oil, soup, milk, white of egg or other albuminous substances; also avoid mucilaginous or alcoholic drinks. If it cannot be determined what quantity of Phosphorus has been taken, the old or French Oil of Turpentine may be given in 4 doses of ½ teaspoonful at 15 minute intervals. If the stomach will not retain the Turpentine, it has been recommended that it be injected into the rectum, atomized into the lungs, the air of the room saturated with its fumes, or that it be rubbed into the skin in the form of a liniment. The French Oil of Turpentine is quite soluble in Ether and Alcohol. Turpentine (old) forms with Phosphorus an almost insoluble mass, the so-called Turpentine-phosphoric Acid. (100 times as much Turpentine should be given as there was Phosphorus taken.) It should be given in hot water or alone (floated on the water or in capsules) immediately after the Phosphorus has been taken or as soon thereafter as possible. It is considered valueless if not given within 12 hours after.

Potassium Permanganate recommended (4 gr. in an ounce of water, frequently, or several pints of the same strength used to wash out stomach). Or 1 to 3% Hydrogen Peroxide solution may be used instead.

Lime Water freely, or Charcoal (a teaspoonful mixed in a small cupful of water) may be given to prevent action upon the tissues. If nothing else is at hand, some recommend giving Gum Arabic or Tragacanth in water to protect the stomach.

3. If the Turpentine given does not freely purge, give **Magnesium Sulphate** (Epsom Salt; 2 tablespoonfuls in water or Infusion of Senna, Sweet Spirit of Nitre (a teaspoonful in water) or more old Turpentine (in ½ drachm doses in mucilage every ½ hr.).

If the bladder is inactive use a catheter frequently.

4. **Give Opium** to counteract the pain and the cardiac and systemic depression. Powdered Opium (1 to 2 grains every ½ to 2 hours), or Laudanum (10 to 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours).

5. **Transfusion may be necessary** to repair the blood. Inhalations of highly diluted Turpentine vapor are beneficial; also of pure oxygen. Hydrogen Peroxide, given in solution or injected subcutaneously, has been highly recommended.

6. **Magnesia,** Milk of Magnesia, Chalk, or Lime suspended in gruel have been recommended. After acute symptoms over, give Sodium Carbonate freely for acid intoxication. Apply heat to feet and body.

PHYTOLACCA (POKE: "Berry," "Root," and "Weed." Garget; Pigeon Berry; Crow Berry; Cancer Root; Red Weed; Red Ink Plant, etc.).

SYMPTOMS:

Nausea; vomiting; slowing of heart and respiration; depression; dyspnea; palpitation.

TREATMENT:

1. **Vomiting and purging are frequently produced by the poison, but syphoning out the stomach with stomach-tube and much water is desirable.** If evacuation does not occur, give Apomorphine Hydrochlorate, hypodermically (1/10 grain every 10 or 15 minutes until effective), or Mustard (a tablespoonful in a small cupful of water).

2. **Stimulate.** Give Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or Aromatic Spirit of Ammonia (a teaspoonful in water every 10 to 15 minutes), or Compound Spirit of Ether (½ to 2 drachm doses in water every 10 to 20 minutes). Support heart with Tincture of Digitalis (10 to 20 drops in water every ½ to 2 hours), or Digitalin (1/100 to 1/50 grain doses hypodermically every ½ to 2 hours).

3. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ¼ to 2 hours), to relieve pain and nervous irritability.

POTASSIUM CHLORATE—Chlorates—Nitrates.

HISTORY:

Fatal dose: from ½ ounce upward, in ¼ to 12 days.

SYMPTOMS:

Poisonous doses interfere with the oxygenation of the blood corpuscles and produce toxic haemaglobinuria. Evidences of severe irritation of the alimentary canal and of the nervous system; severe dyspnœa; cyanosis; the skin usually jaundiced; delirium; coma. Acute tubal nephritis is produced; the excretion increased, but its chemical reaction unchanged.

TREATMENT:

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After emetic, give plenty of lukewarm water. Pilocarpine cautiously, favors salivary excretion.

2. **Give demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, gelatin, flour and water, barley or starch water, oatmeal gruel, or even crushed bananas) to soothe and protect the irritated and inflamed surfaces.

3. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body) to maintain bodily temperature.

4. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours; or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth, or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

Employ inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary).

Avoid stimulants, or anything likely to increase the congestion of the kidneys, if severe.

PRECIPITATE, RED OR WHITE.

(See Mercury).

PROTEINS

(Poisoning: As food p. 224a. By inhalation p. 148c).

PTOMAINS (PUTREFACTIVE, CADAVERIC OR ANIMAL ALKALOIDS).

HISTORY:

Ptomains are alkaloidal or basic products of the putrid decomposition of animal or vegetable matter. Many of the Ptomains respond to most of the ordinary reactions of the vegetable alkaloids, thus leading to confusion or error in toxicological investigations. Not all Ptomains are poisonous, and quite often that which is called Ptomain-poisoning is really due to a mixture of substances containing no recognized causative Ptomain. Frequently such poisoning is an auto-intoxication (q. v.).

The reactions of certain Ptomains duplicate the actions of the following alkaloids: Atropine, Colchicine, Coniine, Delphinine, Digitalin, Nicotine, Strychnine and Veratrine.

SYMPTOMS:

The substances which produce symptoms very much like those of Atropine are called Ptomatropines. They have been found in corned beef, poisonous sausage. decaying fish, and putrid game. They cause dryness of the mouth, great thirst, red and swollen gums, dilated pupils, drooping eyelids; occasionally loss of voice, great weakness; there may be chills, vomiting, diarrhœa, offensive, dark-colored stools, temperature 101 to 104, convulsions, almost a palsy; even death, from paralysis of the heart. Post mortem examinations may show congestion of brain, lungs and kidneys; etc.

Oily, alkaline, volatile substances resembling Coniine in their reactions have been discovered in decomposing animal tissues.

The reactions and physiological effects of certain ptomains from corn meal are somewhat similar to those of Strychnine.

Digitalin-like substances have been discovered in liver sausage.

A substance giving most of the reactions of Colchicine has been found in beer.

Poisons formed during putrefaction, etc.

Tyrotoxicon is said by some to be a poisonous proteid allied to the tetanus and diphtheria toxins; It is found, at times, in stale milk, cheese, ice-cream and certain milk products.

Tyrotoxicon produces vomiting, purging, rapid pulse, dilated pupils, hurried breathing, depression of temperature, prostration, and death.

Typhotoxine—a substance produced by the Eberth bacillus of typhoid fever, kills mice and guinea pigs in a day or two.

Mydaleine, found in decaying cadaveric liver, spleen, etc., causes increase in temperature when hypodermically administered.

Neurine, found in decomposing animal tissue, acts similar to Curare.

Cancroin is believed to be similar to Neurine and the active agent in producing cancer. Susotoxine, Choline, Methylguanidine. Isoamylamine. Patoamine, Trimethylenediamine, Ethylidenediamine, etc., also cause more or less serious symptoms or death.

TREATMENT:

Treat as in Food, Poisonous (q. v.).

PULSATILLA.

HISTORY:

Death by paralysis of heart.

SYMPTOMS:

Reduced heart action, respiration, and temperature; pupils dilated; motion and sensation paralyzed.

TREATMENT:

1. **Evacuate** the stomach: syphon out the stomach with a stomach-tube, using plenty of water. If the stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of

water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of luke-warm water to encourage vomiting.

Give Tannic Acid (in 10 to 20 grain doses).

2. **Stimulate.** Give Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), and Tincture of Digitalis (15 to 20 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour).

3. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum, 20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically, every ¼ to 2 hours), to relieve pain and tenesmus.

RABIES VIRUS, Rabic Poison—[Infection (Poisoning) by Saliva—("Mad-dog-bite," etc.)].—[Rabies (Hydrophobia)].

HISTORY:

Rabies (hydrophobia) may result from bite or other salivary infection by dog, cat, wolf, fox, horse, cow, hog, skunk, deer, human being, or other warm-blooded animal; also by laboratorial inoculation.

Certain spherical and oblong bodies called Negri bodies are found only in the brain cells of animals which have died from hydrophobia, or have been killed during its course in them. Microscopical recognition of the presence of these bodies determines the condition was that of rabies. If a portion of such brain be injected into the brain of another animal the latter will develop rabies and die of it.

Rabies is declared to be quite common in Russia, France, Belgium, Turkey and Italy; rigid quarantine, muzzling, and other precautions in Australia, Canada, England, Germany, Holland, Switzerland, etc., make its occurrence there infrequent.

It is claimed that about 16 per cent of the persons bitten by rabid animals develop rabies, if not given the Pasteur anti-rabic treatment, i.e., injections of anti-rabic virus (virus vaccine, rabies vaccine); and that the employment of the Pasteur treatment has reduced this percentage to one-half of one per cent. It is evident that this percentage might be reduced still further by early injections of anti-rabic virus administered to all persons bitten by, or in any way possibly infected, i.e., poisoned with the perhaps rabic virus of an animal suspected of being rabid. It is obvious also, that the prevalence of rabies, in general, might be almost eliminated, by similar treatment of bitten animals; or better still, by the immunization of all dogs, and perhaps of other domestic animals.

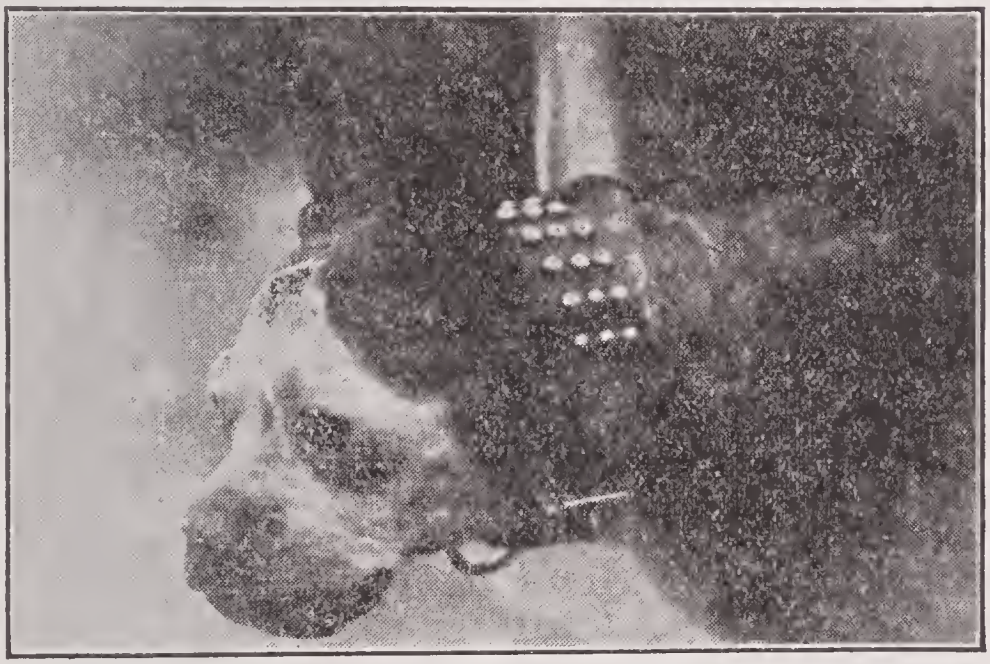
Rabies is quite prevalent in the United States, and definite medical knowledge of suitable palliative measures, in rabies, is insufficient. There is great need of wide publication of the measures which should be employed in suspected or known infection, and of the fact that they must be employed early, before the appearance of the symptoms in order to be salutary; also information as to effective, preventive, or immune measures against infection. It should be common knowledge, especially that rabies vaccine should be given, by injection, in all cases of suspected or at all probable infection.

Rabic bites through thick clothing may be harmless. Rabic bites near large nerve trunks, or where there are many small nerves, are among the most serious ones; also those about the neck, face or head, owing to proximity to the brain—as the infection travels along the nerve routes to the cord and brain.

Great care should be exercised in handling sick dogs or cats as rabies might be present and a bite or a scratch prove fatal. Rabic saliva falling upon cuts, tears, cracks

or abrasions of the skin—scratches, hang-nails, chafed surfaces, etc.,—may infect.

The incubation or developing period in man or other animal, when infected, is from two weeks to a year; as a rule from about three weeks to two months. It may be hastened or delayed according to the facility or difficulty with which the infecting, poisoning virus was introduced; also by the quantity, location, etc., in introduction. Not all of those bitten by rabid animals de-



RABIES (Incipient)
(Case and Photo. Dept. of Health, City of New York)

velop rabies, although not treated after being bitten. Harvey and Acton state, and Cruickshank and Wright agree, that: "The saliva of a rabid dog need not necessarily be infective, need not necessarily contain the virus at all." But it is best to be on the safe side—"safety first"—and to exercise due precaution by employing the Pasteur treatment early.

SYMPTOMS:

Dogs infected by a rabid animal, unless immunized, usually show signs of the infection in two weeks or possibly less; sometimes not for many weeks or months. The infected dog should be placed under observation

for seven to ten days and promptly and well immunized, if seen soon after being bitten. The poison may be communicated by the saliva of an infected animal at any time during the course of the rabic symptoms and for two or three days before their onset.

If a susceptible bitten animal develops rabic symptoms, he should be killed and search made for the Negri bodies, and animal inoculation tests also employed if necessary (see also pages 202h and 202i).

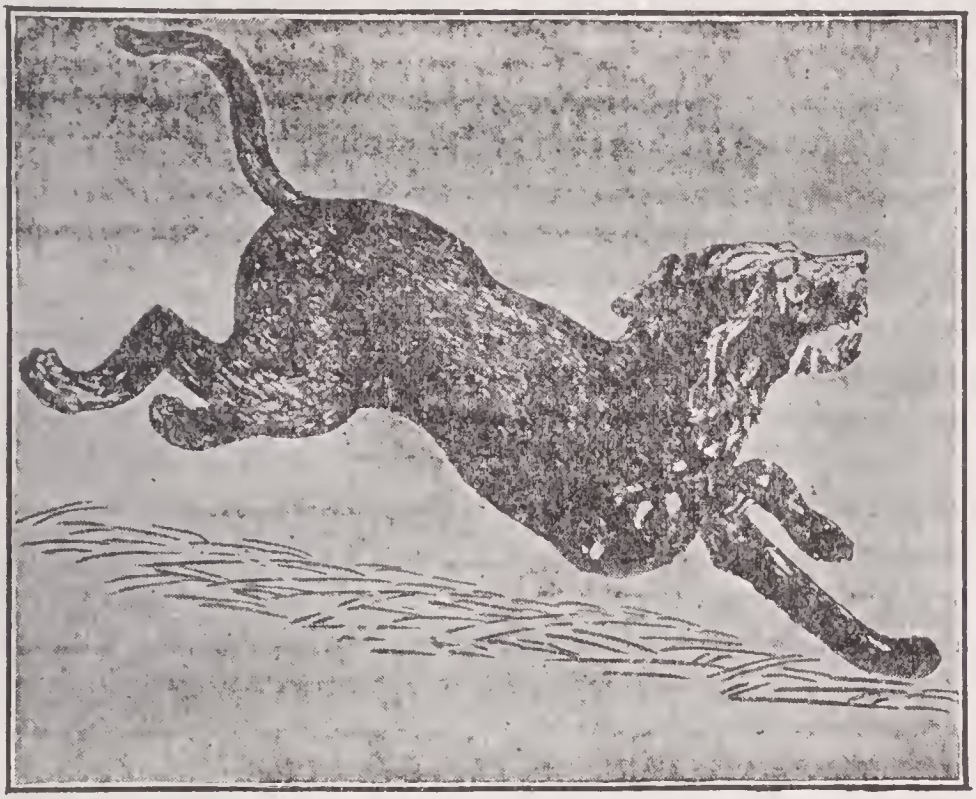
A dog infected by rabic virus, usually shows first a noticeable change in disposition. It may become more affectionate than usual, like a sick child seeking comforting attention; or it may become sullen, dull, depressed, nervous, irritable and suspicious, and although previously good-natured, may become snappy, cross and easily excited. The eyes become red, and as a rule, the appetite is fickle or absent.

As the disease progresses, the dog may develop either the furious type of rabies, or the paralytic or so-called "dumb," or "sullen," type.

A dog sick with rabies may not act as mad dogs are commonly supposed always to act—i.e., he may show no violent symptoms; on the contrary he may be quiet and sleepy, without disposition either to bite or to run away; also weak, especially in the hind legs, with spasm of the throat muscles upon trying to swallow liquids. Quite often such dog crawls into a quiet, dark place and, with increasing weakness, dies in two to five days ("dumb rabies").

In furious rabies, or furious madness, the dog commonly leaves home and wanders aimlessly about, eating such strange substances as straw, rags, earth, excrement, wood, stones, etc. Usually there are illusions, delusions or hallucinations, and the animal springs at imaginary objects. It may have severe spasms of the throat with choking and vomiting, becoming more and more excited until finally it becomes furious and runs "amuck" with blood-shot eyes and the mouth dripping saliva. As a rule it runs in nearly a straight line, snapping and biting at all animals it encounters, even human beings. It may bite itself

and heedlessly chew its own legs. If not destroyed, it usually dies in a convulsion, or from weakness and a resultant paralysis, in 3 to 6 days from the onset of the symptoms. In this type of rabies a peculiar bark is comonly noted. The bark is hoarse and muffled; and a full bark is apt to be followed by five to eight weird, uncanny, unearthly, sinister, throaty howls, the mouth being kept party open after each howl.



FURIOUS TYPE OF RABIES
(Author's illustration)

It is claimed that once heard this sound is never forgotten. However it is said that the mad dog in biting and fighting furiously, rarely or never barks, but that in thus fighting, a non-rabid dog almost always barks.

In the paralytic or dumb variety of rabies a short period of excitation is followed by severe spasms of the throat with perhaps choking. The animal is mostly tame, and voiceless; silent, quiet, gloomy, depressed and dull. Usually exhibits but little inclination to stray or bite; the mouth, dripping saliva, is kept open, from paralysis of the lower jaw; the eyes are expressionless and staring. Increasing muscular

weakness and paralysis usually result in death by the fourth or fifth day.

In the human being, commonly the first signs are tingling and pain at the site of the bite and extending towards the brain. The patient is excitable, talkative, with increase in his reflex responses. A current of air on the skin may cause exaggerated reflex response even a convulsion (Romberg's sign). The voice often becomes hoarse or croaking; there is increasing difficulty

PARALYTIC TYPE OF RABIES
(Case and Photo. Dept. of Health, City of New York)

in swallowing; convulsions and paralysis of legs, etc., commonly follow.

There are two types of rabies in man: The furious and the paralytic. Usually in the furious type the disease develops rapidly. The person infected, feels smothered and gasps for breath; he has difficulty in swallowing, due to convulsive contraction of the throat muscles. The convulsive contractions soon extend more or less widely over the whole body.

A sudden noise, strong draft of air, or flash of light may precipitate a convulsion. At intervals the patient becomes excited and may be actually maniacal. However, as a rule, clearness of mind is

not lost, and altho often panicky, in terror and in dread of the consequences, he maintains a certain degree of self-control and is not likely to attack those about him; but the poisonous and excessive salivary flow may easily infect others by coming in contact, with wounds, cracks or abrasions of their skin.

The patient may die in a convulsion; but usually more or less of a paralytic condition develops and in three or four days from the onset of the disease he dies from cardiac or respiratory paralysis.

Although the typical paralytic variety of the disease is unusual in man, it may occur from an intense infection. The convulsive features of the furious type of the disease are then slight or absent; there is muscular tremor and increasing muscular debility, resulting in a general paralysis and death in from four to six days.

TREATMENT:

Prompt preventative measures should be employed in all suspicious cases. The wound should be well opened and evacuated; then thoroughly cauterized with fuming nitric acid applied by the drop by drop method, and using a medicine dropper or a pointed glass rod: however, at bony, cartilaginous or bloodless points, pure carbolic acid should be used, as it is less likely to prevent due healing; these measures should be followed by the employment of the Pasteur anti-rabic treatment.

The cauterization should be very prompt. Authorities differ as to how long, after a person has been infected, by bite or otherwise, cauterization is effective. Some claim only half an hour, others extend the time to 48 hours. One, believes it should be done as late as 72 hours. The poison or virus passes very slowly thru the nerve fibres towards the brain, from the original point of infection. In fact it is said to remain "for a number of hours, localized in the nerve-fibres in the region of the wound." Proper cauterization may so destroy the infected nerve fibres and connections as to prevent distribution as well as all local existence of the virus.

If cauterization is rather late or even imperfect it may diminish the amount of poison sufficiently for the patient to produce enough antagonists (antibodies) to counteract the otherwise unopposed or unaffected virus.

If the bite inflicted by an apparently innocuous dog, or by any other animal which is susceptible to rabic infection, is seen within 24 hours after the bite, the wound should be freely evacuated. If a punctured wound, or one not well opened, it should be freely opened. It should be well squeezed to express any contained saliva or to make it bleed freely, thus cleansing

PARALYTIC TYPE OF RABIES
(Case and Photo. Dept. of Health, City of New York)

itself. It should then be thoroughly washed with corrosive sublimate solution (1 to 2,000), and dressed subject to inspection. The animal should be placed under observation for a week.

According to the circular of information of the Department of Health of the City of New York:

"The Pasteur Treatment" [inoculating a person, already infected with rabic virus thru the saliva of a rabid animal, with an attenuated and prepared rabic virus, as an anti-rabic virus or rabies vaccine]* "is a preventive treatment against

*N.B.: The bracketed statements are those of the author.

rabies. It is not curative and is of no value after rabies has developed. The course consists of twenty-one daily injections of anti-rabic virus. This material (rabies vaccine) is a virus vaccine, not a serum. As it deteriorates rather rapidly, each dose is prepared daily and sent by special delivery mail."

"To save time, the treatment should be ordered by telegram addressed to the *Assistant Director, Vaccine Laboratory, foot of East 16th Street, New York City.* The order should give the name and the age of the patient."

* * * * * *

"Bites on the face, head or neck increase the dangers of infection on account of the many nerves in these localities and the close proximity of the brain; *the treatment in these cases is an intensive one.* Such cases especially should not only begin treatment promptly but any irregularity in the course of injections should be most carefully avoided. For this reason, we advise that severely bitten patients be sent, if possible, to New York City, or other place where the vaccine is prepared, in order to avoid any delays due to irregularities in the mail.

In extremely severe face, head or neck bites, a second course of treatment is advised. This second course should be started, two weeks after the last dose of the first course.

Cost.—The cost of one course of treatment sent by mail is $25.00. If the patient comes to New York and has the vaccine injected by one of the Department of Health physicians, the cost is $50.00. Should the patient wish a private physician here in New York to give the injections, the cost is $25.00 for the vaccine and whatever charge his physician may make for attendance.

Checks should be made payable to the City of New York Department of Health.

Cauterization.—Prompt cauterization of the wound should not be neglected. The earlier it is done, the more effective it is. *Fuming nitric acid* is the best cautery and is helpful if used within 48 hours of the bite. The acid should be applied on the point of a tapered glass-rod or drop by drop from a capillary pipette, so that the amount may be carefully controlled. Contact with bony, cartilaginous or bloodless parts should be avoided if possible. To these parts apply pure carbolic acid and the fuming nitric acid to the other tissues adjacent. Such tissues heal well after the use of nitric acid.

The actual cautery is effective as far as it reaches the parts of a wound, but fuming nitric acid, being a fluid, reaches the deep crevices which the hot iron may not touch.

The use of pure carbolic acid, iodine, silver nitrate, etc., on wounds made by rabid animals have but little value as compared with fuming nitric acid.

Do not suture wounds made by rabid animals.

Anti-Rabic Treatment Should Be Given:

To persons bitten by animals which have been proven rabid either by clinical symptoms, or by microscopic examination of the brain.

To persons whose hands or face have been contaminated with saliva of a rabid animal without being bitten. This is because of the possible presence of cracks, hang-nails or other small open wounds.

To persons bitten by stray dogs which cannot be located. The treatment is given as a precautionary measure.

To persons bitten, pending the laboratory diagnosis on the brain of the biting animal, provided that the symptoms or actions of the animal were suspicious.

Routine to Be Followed in Regard to Biting Dog

A dog which shows *clinical symptoms* suspicious of rabies should be killed at once and the brain sent to a laboratory for diagnosis. If an *apparently normal* dog bites anyone, it should be kept under observation for ten days to three weeks. The saliva of the dog may be infective on an average of three or four days before the animal shows clinical symptoms. [Dr. A. Silkman, Chief Veterinarian of the Department of Health of the City of New York, states that "it has recently been quite commonly accepted, among scientific observers, that it has been well demonstrated that rabic poison (rabies virus) does not appear in the saliva of a dog, infected with rabies virus, at an earlier date than two or three days before he manifests the first clinical symptoms of rabies. Therefore, a dog which has bitten a person (or under certain conditions, a susceptible animal) should be quarantined for a week under the observation of a skilled veterinarian; and if at the end of that time he has manifested no symptoms of rabies, it may be considered certain that his saliva did not contain the rabic poison at the time of the bite and that therefore the bite could not have infected, and the dog may be released."]* The longest time that a dog, with symptoms of rabies lives, is, usually, five or six days. This period, added to the three or four days above makes a period of about nine or ten days, at least, during which the animal should be under close observation and confinement. Since, however, a prolonged incubation period may occur, it is safer to hold the animal for three weeks. Such animals should not be killed too soon for the reason that a satisfactory laboratory examination of the brain cannot always be made in the early stages of the disease. The microscopic evidence of rabies (the Negri bodies) appears but little earlier than the clinical symptoms. When this

*N.B.: The bracketed statements in the foregoing are those of the author.

evidence in the brain is lacking, a part of the brain must be injected into test animals. This test requires from two to four weeks for completion. [*See page 202*i*.]

FACTS ABOUT RABIES.—Incidence.—About 16 per cent of the human beings develop rabies if not treated after a bite by a rabid animal. Antirabic treatment has reduced this figure to 0.5 per cent.

Period of Incubation.—In human beings, the shortest known time is fourteen days, the longest, seven months (possibly one year). The average time is twenty to sixty days. The period of time depends on the quantity of virus introduced, the point bitten and the strength of the virus.

Bites through several layers of clothing are not so dangerous as those on the bare skin. Since the infection travels along the nerve routes, bites about the face, head or neck are more serious because of their location near the brain and the many nerves present; so also bites involving the large nerve trunks. In such cases, the period of incubation is apt to be short.

The saliva of a human being, who has developed rabies, is not so dangerous as that of the dog; neither is the saliva of a herbivorous animal so dangerous. Nevertheless, all the precautions as to cauterization and treatment should be taken if exposure has occurred.

The period of incubation in a dog which has been *infected* is usually fourteen days or less. Since, however, this period is sometimes prolonged, the animal should be held in quarantine at least six to twelve months.

[More extended observations and increased knowledge have demonstrated that the incubation period for an infected dog is from two weeks to three months, but a dog bitten by a rabic animal may be released from quarantine within ten days, after the bite, if it shows no symptoms of rabies before that time, by promptly immunizing it by giving it 3 to 5 of the anti-rabic injections.]*

Immunity.—The Pasteur treatment requires four to five weeks for the full development of immunity. Three weeks of this time are required for the injections. In a person who is taking the treatment, there is a contest of speed between the passage of the virus from the wound to the brain, by way of the nerves, and the development of immunity due to the absorption of the vaccine through the circulatory system. This immunity lasts, apparently, a variable length of time.

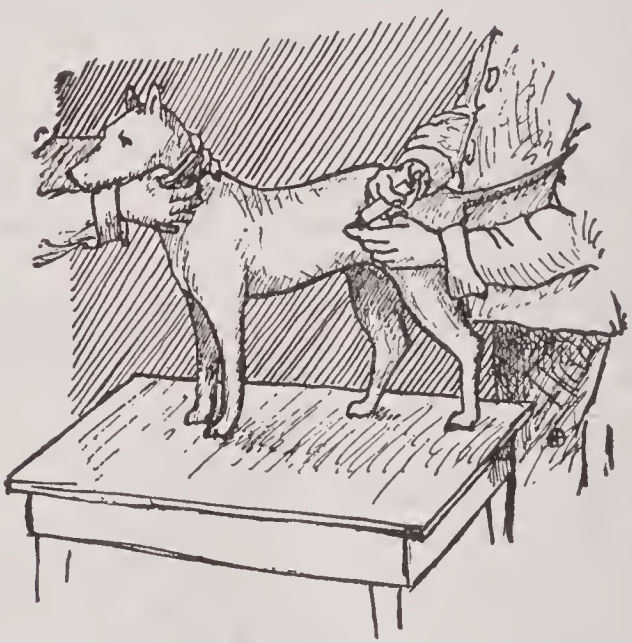
The treatment is considered as having failed to protect only when the patient dies two weeks or more after the end of the course of injections. In those cases in which

*N.B.: The bracketed statements in the foregoing are those of the author.

death occurs within the two week period there may have been unusual susceptibilty or marked intensity of the infecting virus. Delay in starting treatment may be responsible for a failure in protection."

[If the patient "has been bitten by a positively known rabid animal," Drs. Silkman and Regan, of New York, favor a second series of injections after the expiration of six months; and it is recommended that "in cases of face-bites or very extensive wounds from a known rabid animal the course of treatment be repeated two weeks after the completion of the first course," * * * "to reenforce the immunity conferred by the first treatment."

The person under treatment should avoid excitement, severe exercise, exposure to wet and cold and all nervous disturbances.]*



VACCINATION OF DOG (PREVENTING RABIES)
(Author's illustration)

Recently, anti-rabic treatment of dogs, in order to make them immune to rabic infection, has been employed, with seeming complete success, in some towns and cities. Dogs thus treated are tagged, allowed at large and not muzzled. The humanity and wisdom of this procedure will appeal to all friends of animals.

In New York City, it is now the custom, based upon increasing experience and knowledge as to rabic infec-

*N.B.: The bracketed statements in the foregoing are those of the author.

tion, to hold under observation for seven days, if alive, a dog, which has bitten a person or an animal. If no symptoms of rabies develop during that week it is recognized that the saliva of the dog was free from rabic poison at the time he bit the person or animal and it is so stated; it is also stated that at the present time he manifests no symptoms of rabies and therefore he is released from quarantine. Attention is also called to the fact that it is considered advisable to immunize all dogs against rabies, by giving them one anti-rabic vaccine injection. If the dog died before it could be placed under skilled observation, or while under it, the brain is searched for Negri bodies, and if necessary inoculation tests are made also.

If the owner is willing to go to the expense, a valuable dog which has been bitten by a suspected-to-be-rabid, or by an evidently-rabid dog, may be treated by immunizing him against rabies, by giving him three to five anti-rabic injections, instead of the usual single one.

A. Silkman, D.V.S., Chief Veterinarian of the Department of Health of the City of New York, sometime since asserted, in conjunction with the opinion of Joseph C. Regan, M.D., of the Kingston Ave. Hospital of the Department of Health, that:

"Bites by stray dogs, when inflicted without provocation are considered suitable for anti-rabic treatment. The behavior of the dog is the important point in the determination of whether or not bitten persons should receive treatment. The animal should not be killed but be placed under the observation of a competent veterinary. However, if the circumstances of the bite are at all suspicious, the person bitten is placed under treatment without waiting for a veterinary or laboratory diagnosis. If the examination of the dog by a veterinary, or of the animal's brain for Negri bodies, is negative the treatment is discontinued. If it proves positive, valuable time will not have been lost. Examination of the brain for Negri bodies is not always conclusive. Resort then must be had to animal inoculation of the suspected material; this process requires from ten days to two weeks, which delay might prove disastrous if the establishment of the diagnosis by this method was waited for."

PALLIATIVE TREATMENT IN HYDROPHOBIA:

Give Chloroform (5 to 30 drops) in sugar and water. Give Morphine hypodermically (¼ grain every 1 to 3 hours) until under influence. Rectal injections of Chloral up to 2 drams per day and with Potassium Bromide is recommended. Spray throat with 4 per cent solution of Cocaine. Hyoscine is helpful.

Feed per rectum with nutritive enemas and suppositories. Put patient in a dark room and keep quiet and warm. Exclude all draughts. Place patient in a restraining sheet and on a narrow bed if inclined to be violent. Nitrite of Amyl or Chloroform inhalations help.

RAT PASTE—"ROUGH ON RATS"; ETC.

(See Arsenic; also Barium and Phosphorus.)

Feeding:

If liquids can not be swallowed give such semi-solids as ice cream, custard, jelly, etc.; or resort to nutrient enamata.

RESORCIN.

HISTORY:

Is used as an antipyretic and antiseptic. Very few cases of poisoning.

Fatal dose: 2 drachms have nearly caused death. Death by paralysis of respiratory centres.

SYMPTOMS:

Dizziness; tingling sensation—"pins and needles"; severe perspiration; lips blanched; dry tongue; low temperature; normal pupils; black urine; clenched teeth; unconsciousness.

TREATMENT:

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water every 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). While syphoning, or after giving the emetic, give plenty of lukewarm water containing Soda or Saccharated Lime.

2. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful dose hypodermically as frequently), [**Red Wine, used freely, is considered an excellent antidote**], or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ¼ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

3. **Give demulcents** (such as white of egg, milk, oil, flaxseed or elm tea, barley, gum arabic or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces.

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or

bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature. **Maintain recumbent position.**

Also employ friction and use an interrupted electric current if necessary.

RHUS—RHUS RADICANS, RHUS TOXICODENDRON (POISON VINE, POISON OAK, POISON IVY, POISON CREEPER, MERCURY)— RHUS VENENATA (SWAMP-SUMACH, POISON-SUMACH)— POISON DOGWOOD (POISON ELDER) — SNOW ON THE MOUNTAIN—ETC.

HISTORY:

Rhus often mistaken for the Virginia Creeper; but leaves of Creeper divided into 5 leaflets, leaves of Poison Ivy into three. Poison Ivy is a green vine climbing over walls and fences and hanging over rocks; sometimes is erect. In May and June has greenish-white flowers in loose clusters at junction of leaves and vine. Fruit: small, smooth, waxy, changed to reds, browns and yellows. Fruit of Poison Sumach is yellowish. Satinwood-dust poisons.

SYMPTOMS:

Itching; swelling; vesicular eruptions; throat may be involved, causing cough; thirst; vomiting; colicky pains, with fever and delirium. (Rhus poisoning is due to an active principle, a non-volatile oil called toxicodendrol, contained in the pollen, hairs, etc.). Used internally, causes a species of intoxication.

TREATMENT:

1. **Wash well** with hot soap suds, then apply a **dilute—alcohol solution of Lead Acetate.** A lotion of Fluid Extract of Grindelia Robusta (1 part, water 10 to 48 parts), or of Sodium Hyposulphite, often relieves. For burning pain, etc., use a 5 per cent, aqueous solution of Cocaine, or of Phenol, or weak Ammonia Water, or a Sal Ammoniac solution (1

ounce to 1 pint of water) or iced, saturated solution of Sodium Bicarbonate, or the same of Boric Acid; or promptly sponge the part with Benzene, Chloroform, Gasoline, Spirit of Camphor, or Formaldehyde Sol., Phenol (weak sol.), or Potass. Permang., or Corrosive Sublimate, in a weak solution, or even lemonade. After blisters rupture, Lime Water, with or without milk, aids. An infusion of Lobelia (1 oz. to water 1 pt.), or Witch Hazel, or Alum Water, are useful; also Ichthyol, Aristol toilet powder, etc. Secondary applications are cold cream, vaseline, oil, etc., after neutralizing the poison. If fats or oils are used early, they spread the poison. Treatment of the dermatitis, caused by poison ivy or poison oak, by giving 3 to 5 intramuscular injections (each 3 to 5 minims) of a weak solution of the active principle of the respective plant, at intervals of 1 to 3 days, seems to have been distinctly curative in some cases; and, by giving 4 such injections, at intervals of 3 or 4 days, then following them with a tincture of the respective plant, given by mouth in doses of 5 to 10 drops 3 times a day for a month, if well borne, seems to have established at least a temporary densitization or immunization in most persons thus treated. To prevent eruption after recognized exposure, apply wash of zinc sulph. (5 to 10 grs. to ounce of water, according to severity of exposure or irritation).

2. **Give Magnesium Sulphate** (a tablespoonful).

3. **Give Opium** (Powdered Opium, 1 to 2 grains, or Morphine Sulphate, ¼ grain, or Laudanum, 20 drops; give every ½ to 2 hours by mouth, or in gruel by rectum as frequently). Give simple diet.

SANGUINARIA (BLOOD-ROOT).

HISTORY:

Death by paralysis of cardiac and respiratory centers.

SYMPTOMS:

Severe salivation; violent vomiting; severe purging; faintness; vertigo; coldness; dilated pupils; re-

duced temperature; slow pulse; great prostration; intense thirst; convulsions; collapse.

TREATMENT:

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective, or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving the emetic, give plenty of lukewarm water to encourage vomiting.

Tannic Acid (in 20 gr. doses) is recommended.

2. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given.

3. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth or hypodermically every ¼ to 2 hours), to relieve local irritant action.

SANTONIN.

HISTORY:

About 2 grains of Santonin killed a boy 5½ years of age in 15 hours; flower heads equal to 30 grains of Santonin killed a girl 10 years old; 1 7/10 grains has caused death of a child 5 years old in 15 hours.

The maximum dose for children may be said to be 1 to 2 grains, and for adults about twice as much.

Death by asphyxia.

SYMPTOMS:

Color vision is disturbed, objects first assuming a violet or bluish, then yellow tinge; ringing in ears; headache; dizziness; dilated pupils; sweating; weak pulse; abdominal pain; convulsions; stupor.

Santonin is excreted by the kidneys, coloring acid urine greenish-yellow, alkaline urine cherry-red or crimson.

TREATMENT:

1. **Evacuate the stomach:** syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, give plenty of luke-warm water to encourage vomiting.

2. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses by mouth every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hy-

podermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ¼ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ¼ to 2 hours). Tincture of Digitalis (15 to 30 drops by mouth, or as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purpose. Draughts of strong coffee may also be given. **Chloroform, or Chloral per rectum, for convulsions.**

SAVINE.

HISTORY:

The poison is recognized by its odor. There is no reliable chemical test.

Usually poisoning by decoctions or infusion of Savine Leaves. Oil or Tincture of Savine may poison. Oil of Savine is present in the leaves to the amount of about 2 per cent.; 10 per cent. in the fruit.

Death from Savine may occur within 12 hours or be delayed for 2 or 3 days.

Death by collapse.

SYMPTOMS:

Pain in abdomen; vomiting; straining and bloody stools; difficult respiration; convulsions; coma; collapse. Sometimes severe irritation of urinary organs, such as strangury and bloody urine; odor of drug in urine; may be vomiting of blood anesthesia, uterine hemorrhage, and abortion.

TREATMENT:

1. **If patient has not vomited freely, repeatedly syphon out the stomach** with warm water, or give **Apomorphine Hydrochlorate**, hypodermically (1/10

grain, repeated every 15 minutes until effective). Or **if the throat is not much inflamed, may give an emetic of Mustard** (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or **Zinc Sulphate** (20 grains in 2 tablespoonfuls of water, repeated every 10 to 15 minutes until it produces vomiting), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until it acts).

2. **A dose of Castor Oil** (an ounce, i. e., 2 tablespoonfuls), or of Magnesium Sulphate (an ounce, i. e., 2 tablespoonfuls), should be given unless bowels have freely moved. Apply poultice, for abdominal pain.

3. **Give demulcents** (such as white of egg, milk, arrowroot, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated and inflamed surfaces.

4. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours), or Tincture of Digitalis (15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour) and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given. Artificial respiration if required.

5. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or

bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature. Sometimes cold to head.

6. **Give Opium** (Powdered Opium, 1 to 2 grains) or Laudanum (20 drops by mouth, or ½ teaspoonful by rectum in gruel), or Morphine Sulphate (¼ grain by mouth or hypodermically) every ½ to 2 hours), or Chloroform, Chloral, or Bromides, to relieve pain, nervous irritability, etc.

SCHEELE'S GREEN.

(See Arsenic).

SCOPARIUS.

(See Digitalis).

SCORPION, ETC.

(See Insects).

SEWER GAS (CESSPOOL AND PRIVY EMANATIONS).

HISTORY:

As a rule the sewer gas and privy emanations consist of a mixture of Sulphuretted Hydrogen, Ammonium Sulphide and Nitrogen, but sometimes only of deoxidized air, with an excess of Carbonic Acid Gas.

The poisonous vapors of cesspools consist of Carbonic Acid, Sulphuretted Hydrogen and Nitrogen.

Entrance of Sewer Gas into bed-rooms, or the exposure to the emanations of cesspools in cleaning them out, have produced fatal result. Emanations from open street gratings sometimes produce serious symptoms. Sewers, cesspools, privies, etc., should be well stirred to permit the escape of the contained gas before cleaning them out. It is well also to disinfect them.

SYMPTOMS:

When the poison is concentrated, death may occur at once. If not concentrated, a few moments exposure may produce the following symptoms: Unconsciousness, which resists all attempts to relieve; lips

livid; pupils dilated and not sensitive to light; eyes fixed and turned upwards; conjunctiva injected; countenance pallid, pink or purple; may be froth issuing from the mouth.

TREATMENT:

No true antidote is known.

If there is time to do anything, fresh air, stimulation with Ammonia to the nostrils, and Aromatic Spirit of Ammonia by mouth (½ to 1 teaspoonful in water every 10 to 20 minutes), and Brandy or Whisky (in teaspoonful doses by mouth, or half as much hypodermically, every 10 to 20 minutes), and Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ¼ to 2 hours) will help. Rest is beneficial. Transfusion of blood and the introducing of a normal salt solution into the veins have proven advantageous. Chlorine water or Dilute Hydrochloric Acid and Potassium Chlorate internally, are recommended.

Give Oxygen inhalations. Artificial respiration.

SILVER COMPOUNDS (SILVER NITRATE, LUNAR CAUSTIC) — ETC.

HISTORY:

Nitrate of Silver turns black when contaminated with organic matters. It acts principally as a corrosive poison when taken internally. Prolonged administration of the Silver compounds produces a blue or gray-black indelible discoloration of the skin, beginning first around the nails and fingers. Acute poisoning is rare; usually from accidentally swallowing a piece of Nitrate of Silver stick. 30 grs. has killed.

Death commonly results from asphyxia.

SYMPTOMS:

Pain; vomiting of a white cheesy matter, which in sunlight rapidly turns black; purging; cramps; dizziness; cardiac depression; respiratory disturbance; convulsions; paralysis; coma; collapse. Chronic poisoning by Silver Iodid or Nitrate shown by blue skin.

TREATMENT:

1. **Give Sodium Chloride**—common salt—(a tablespoonful of salt to the pint of water or even milk) freely, as the chemical antidote. It forms Sodium Nitrate, precipitates the Silver as the insoluble and harmless Chloride, and acts as an emetic. Ammonium Chloride may be used instead.

2. **Evacuate the stomach,** syphoning it out with water containing a tablespoonful of salt to the pint. If the syphon is not at hand, give Mustard (a tablespoonful in 2 tablespoonfuls of water, repeated in 10 to 15 minutes if vomiting has not resulted), Quassia tea or other bitter infusion, or greasy water (is best to avoid Zinc Sulphate after salt), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 15 minutes until it vomits), with much water. Follow with some more salt water. **Salt is the best antidote,** but white of egg and copious draughts of milk may be given with benefit, having some antidotal effect and serving as food until the stomach has recovered.

3. **Give demulcents** (as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal, gelatin, flour and water, or even crushed bananas), to soothe and protect the irritated or inflamed surfaces. Give Tannin, also give alkalies.

4. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

5. **If necessary, stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours),

and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis 15 to 30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary) may be used for same purposes. Draughts of strong coffee may also be given.

SNAKE VENOM [SNAKE BITE. (The Bite of Various Poisonous Snakes.)]

(See pp. 243-4.)

HISTORY:

The venom of the viper contains albumin, albumoses and globulin, all poisonous. The venom of the cobra contains albumin, globulin and syntonin, all poisonous. One four-millionth of the body weight of cobra venom causes death. It is believed snake venom disintegrates human blood corpuscles.

Death by paralysis of cardiac and respiratory centres usually inside of 12 hours. If death occurs in a few minutes, due to thrombosis; if, under 24 hours, by paralysis of cardiac and respiratory centres; if after 24 hours, by exhaustion or sepsis. In fatal cases the blood deteriorates and will not coagulate.

Poisonous snakes are thicker than harmless ones, and the tail is shorter. They also appear rough, owing to the dorsal scales being keeled. The head is also triangular; they have a peculiar pit or depression in the upper jaw between the eye and the nose, and they have elliptical pupils. The poison is secreted by glands corresponding to the parotids in man; it is a thin yellowish fluid, varying in quantity from one drop to a drachm, according to the variety and size of the snake.

SYMPTOMS:

*[Symptoms occur quickly; more or less severe; commonly: intense shock; clammy skin; great thirst; severe pain in part bitten—pain area rapidly increases; locally, partial paralysis; intense swelling of portion of body injured—which later be-

*Author's uncondensed text.

comes livid and gangrenous; fainting; vomiting; small, frequent, irregular pulse; hemorrhages; bloody stools and urine; lethargy; difficult respiration; convulsions; death.

It is thought the quantity of peptones in the venom determines the amount of local edema, severity of the convulsions and degree of the paralysis of respiration; it is supposed the globulins disorganize the blood and produce hemorrhage.]

TREATMENT:

*[1. Get the poison out where it went in, and do it quickly; keep it there until you do so. Seize the bitten part, with both hands, firmly between the wound and the heart (but close to the wound) to keep the poison at the wound; if the wound be on an extremity have some one tie tightly a strong band (rope, string, handkerchief—anything) around the part, close to your hands (but nearer the heart, and two or three more every 1½ or 2 inches beyond that one, and keep them there for 20 or 30 minutes. Then (or even while the hands alone were holding, if there be help enough to do it,) cut deeply 4 or 5 horizontal lines about ¼ inch apart, so placed that the bites will be about the center of the series; and in the same way cut 4 or 5 vertical lines across the horizontal ones, thus making a lot of little squares with the bites nearest the middle ones; this frees the poison and causes the blood to flow copiously and to wash it out and away; then suck the wound vigorously if neither lips nor mouth have cut or abrasion, (the gastric juice destroys any venom which may be swallowed accidentally), or use a cupping glass, or put alcohol in glass or bottle, and burn, then apply, or use breast pump, to encourage removal of the venom from the wound. When well done, or before completed, if possible, surround the bites with a circle of deep injections (about ½ inch apart) of a 1 or 2 per cent solution (1 grain in about 2 teaspoonfuls of water, or a wine-color solution) of potassium permanganate, to oxidize, neutralize or burn up the venom; or if no hypodermic is at hand, such a solution, or even one of only 5 or 10 grains to the pint, may advantageously be freely poured into the more or less evacuated wound and the wound finally dressed with any of these solutions on clean gauze or cloth. When the wound has been freely evacuated, and if possible oxidized by the permanganate, the circulation-interrupting bands may be carefully loosened and some of the blood from the injured part allowed to flow to the heart and then the bands retightened; if no markedly serious effects are observed from this loosening, it may be repeated at 10 to 20 minute intervals, until the safety of a restored free circulation from the wound seems to be established.

The foregoing seems to be the best procedure; but some authorities favor quickly cutting out the bitten part or cauterizing it thoroughly with caustic, or a red hot iron, or a live coal, or applying strong nitric acid, or even applying gunpowder and setting fire to it. Very many favor the subcutaneous injection or application of a potassium permanganate solution. Injection about the wound of a 10 per cent solution of Calcium Hypochlorite or of a solution of Aurum Chloride has been recommended; also free application of Ammonia Water; also

washing wound thoroughly, then applying a 25 per cent. Carbolic Acid solution; also free application of Tincture of Iodine; also giving of Galium Circæzans, internally. Elimination may be aided by inducing free perspiration or salivation by Pilocarpine Hydrochlorate (1/100 to 1/60 grain hypodermically).

Bleeding bitten limb and transfusing new blood into other limb, recommended be done if severely poisoned by cobra.

The administration, or hypodermic injection (in 15 to 30 c.c. doses for adult, children half as much), of a horse serum (one is called Antivenene) has saved lives of many persons bitten by the cobra, or other snake. Inject it into abdominal, cellular tissue within 2 hours after bite; use Permanganate solution at bite, or inject into and around bite 8 c.c. of 1:60 solution of Calcium Hypochlorite. Bile, or the water soluble portion of it, is said to be beneficial also.

2. **Encourage heart action and circulation** by weak interrupted galvanic currents to chest near heart. Rub briskly over heart and firmly over body. Give coffee; fresh air freely.

3. **Give Ammonia inhalations** and stimulate with Brandy or Whisky very freely (2 to 8 teaspoonful doses or more every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently); or give Aromatic Spirit of Ammonia (a teaspoonful in water, or inject ¼ teaspoonful each of such Ammonia and of water, if possible, into radial vein, as frequently); or, Strychnine Sulphate (1/60 to 1/20 grain hypodermically every 10 to 20 minutes if necessary, for several doses). Some advise to carry whisky to point of narcosis—is debatable.

If respiration is seriously interfered with, resort to artificial respiration and maintain for several hours.

Keep patient warm, quiet. Transfusion of healthy blood or intravenous injection of normal salt solution may be required.

In rattlesnake bite, Olive Oil freely, both externally and internally, is by some considered a specific.

It is believed snake-charmers render themselves immune to venom by taking small doses by the mouth.]

*Author's uncondensed text.

SNEEZE WEED (Stagger Weed).

Causes sneezing, staggering, dyspnea, convulsions, death. If swallowed, emetics, cathartics. However poisoned, employ rest, fresh air, oxygen, external heat, and sedatives and stimulants as indicated.

SPIGELIA (PINK ROOT).

SYMPTOMS:

Vertigo; dimness of vision; dilated pupils: dry throat; convulsions; delirium.

TREATMENT:

1. **Evacuate the stomach:** Syphon out the stomach with a stomach-tube, using plenty of water. If the stomach-tube is not at hand, use an emetic, such

as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a teaspoonful in a small cupful of water, repeated in 15 minutes if not effective), or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of lukewarm water to encourage vomiting.

2. **Stimulate heart, circulation, and respiration** as described under Savine on Page 208.

SPURGE

By mouth, seed or juice produces violent vomiting, diarrhoea, debility, sometimes death. Externally, burning, itching, blistering, raw surface. When swallowed, treat as for Belladonna; when external, use applications as for Rhus (q.v.).

STAINS (See Appendix.) Treat effects of a connected toxic solution according to the poison.

STROPHANTHUS (KOMBE ARROW POISON)—STROPHANTHIN—OUABAIN.

HISTORY:

Fatal dose: Strophanthin is three times as poisonous at Atropine, ten times as poisonous as Strychnine, and twelve times as poisonous as absolute Hydrocyanic Acid.

Death by paralysis of the heart (in systole).

SYMPTOMS:

Pulse weak; urine increased; muscular rigidity; spasms.

TREATMENT:

Recumbent position.

1. **Evacuate the stomach if just taken;** syphon out the stomach with a stomach-tube, using plenty of water. If the stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomit-

ing is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of lukewarm water to encourage vomiting.

Give Tannic Acid or Gallic Acid (30 grains in a little water).

2. **Stimulate, by the mouth,** or if vomiting persists, by the bowel. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently) or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

3. **Give a saline cathartic,** such as Epsom Salt, with much water.

4. **Give inhalations of Chloroform or Ether,** to secure muscular relaxation. Give Chloral as the best antagonist (30 grains in water by mouth, or twice as much by rectum) as soon as possible; then in 20 grain doses hourly while convulsive tendency continues. Potassium Bromide (a drachm in water every ½ to 1 hour by mouth, or ½ to 2 drachms by rectum) may be given, but its action is rather slow. May give both Chloral and Bromide, keeping patient gently narcotized during several hours if necessary. Inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes.

Curare (1/20 to 1/6 grain hypodermically) and Calabar Bean (Physostigmine Sulphate, 1/100 grain

hypodermically) and Potassium Permanganate are recommended.

Aiso ice to spine, and a tobacco enema.

For threatened death from embarrassed respiration, resort to artificial respiration (rhythmically raising and lowering arms from straight at sides to up over head and back again, 18 or 20 times a min.

SULFONAL—TRIONAL—TETRONAL— VERONAL—AMMONAL—ETC.

HISTORY:

Death in 40 hours from two 15-grain doses Sulfonal taken in 1¼ hrs. Also death on fourth day from taking over an ounce. Rocovery from 3 ozs. Veronal, death from 1½ drams.

SYMPTOMS:

Giddiness; confusion; weakness; tumbling and walking about unsteadily; cyanosis; suppressed urine; ptosis; may be pain in stomach, vomiting and papular skin eruption; collapse; coma.

TREATMENT:

1. **Evacuate the stomach if poison was taken only a short time before**; syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting. Keep patient horizontal.

2. **Give Spirit of Nitrous Ether** (1 to 2 teaspoonfuls in water every ½ to 2 hours) and **Magnesium Sulphate**—Epsom Salt—(2 tablespoonfuls in a cup-

ful of water). **Give Sodium Bicarbonate** (a teaspoonful in a gobletful of water). Heat to body.

3. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently). Strychnine Sulphate (1/60 grain hypodermically, repeated in 10 to 30 minutes if necessary). Draughts of hot strong coffee or Caffein Citrate (2 or 3 grain doses) are also good. Artificial respiration if required.

TANSY (TANACETUM VULGARE).

HISTORY:

Fatal dose: As a rule ½ ounce of the oil causes death; 1 drachm of it has caused death. The dose of the oil is 1 minim.

Death by paralysis of heart.

SYMPTOMS:

Characteristic tansy odor of breath; consulsions; unconsciousness; dilated pupils; hurried, stertorous breathing; full, gradually weakening pulse.

TREATMENT:

Treat same as in poisoning by Savine.

TIN COMPOUNDS.

SYMPTOMS:

Metallic taste in mouth; vomiting; diarrhoea; pain; diminished heart action.

TREATMENT:

1. **Evacuate the stomach;** syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of

water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Give milk or white of egg freely.** Ammonium Carbonate (in 5 grain doses in a small cupful of water), also Sodium Bicarbonate, have been highly recommended for poisoning by the Chloride.

Magnesia mixed in water should be freely given and followed by mucilaginous and albuminous drinks, such as flaxseed tea, elm bark water, gruel, gum arabic or gum tragacanth water, or white of egg in water.

3. **Give Opium for pain** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypoderm. every ½ to 2 hrs.) to relieve pain and nervous irritability.

4. Stimulate as in Antimony.

TOBACCO—NICOTINE.

HISTORY:

Pure Nicotine is a colorless oily liquid, and is rapidly fatal. Havana tobacco contains 2%. Kentucky, Tennessee and Virginia tobaccos, 6% or 7%. Poisoning has resulted from mistaking infusion for coffee; from tobacco chewing and smoking; from giving for worms, or to induce abortion: from children using old tobacco-pipes to blow soap bubbles; from local applications of tobacco, etc. Death from enema of ½ dram of the leaves. Boys have died as result of smoking tobacco. "The hot volatile, gaseous nicotine in the tobacco of the cigarette is released by the burning

process and absorbed by the mucous membrane of the mouth, larnyx, vocal cords, trachea, or the lungs with its 2,000 sq. feet of surface exposed to the action of the toxin." The objectionable products, also in using cigar and pipe.—P. G. in Med. Counc. Fatal dose of Nicotine, M.iii—60 in ¼, 2 or 3 hrs.

Death by paralysis of respiration or of heart.

SYMPTOMS:

Severe depression; giddiness; feeling of wretchedness and weakness; nausea; vomiting; weak, rapid pulse; cold, clammy skin; pupils at first contracted, then dilated; dyspnœa; muscular tremblings; there may be convulsions; coma.

TREATMENT:

Put patient in a horizontal position.

1. **If free vomiting does not occur, evacuate the stomach**; syphon out the stomach with a stomach-tube, using plenty of water. If the stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of water to encourage vomiting. Before beginning or completing syphonage, or before vomiting occurs or ceases, give Tannic Acid or Gallic Acid (30 grains in a small wineglassful of water), or in lieu may give Iodine (1 to 2 grains) and Potassium Iodide (5 to 10 grains) in water (1 to 2 tablespoonfuls), or in absence of these, copious draughts of strong tea or a decoction of oak bark (½ ounce to a small cupful of water).

2. **Give Spirit of Nitrous Ether** (1 to 2 teaspoonfuls in much water).

3. **Give Strychnine Sulphate as the true physiological antidote** (1/60 to 1/20 grain hypodermically,

every ½ to 2 hours), or Tincture of Nux Vomica (30 minims in 2 tablespoonfuls of water by mouth), as an antagonist. Also stimulate with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or give Chloroform (20 to 30 drops in water every ¼ to 2 hours). **Apply cold to the head.**

4. **Employ artificial heat** (such as hot water bottles, or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to feet and sides of body). Artificial respiration and oxygen if required.

NOTE.—Is claimed, in cigarette habit and tobacco smoking, craving is lost or lessened by rinsing mouth with Silver Nitrate solution (¼ to 1 grain to water 1 ounce) just before smoking. Should also avoid stimulating foods and beverages.

TRIONAL.

(See Sulfonal).

TRUFFLES.

(See Fungi).

TURPENTINE—OIL OF TURPENTINE—(SPIRIT OF TURPENTINE).

HISTORY:

Usually given by mistake, or overdose when used to expel worms. A child died in 15 hours from ½ ounce of the oil; a teaspoonful killed a 5 months old infant; recovery in child under 2 years old after taking a tablespoonful. Death of adult from 6 ozs.

Death by paralysis of respiration.

SYMPTOMS:

A Turpentine odor in the breath. Usually there is giddiness and a kind of intoxication, followed by gastro-enteritis; there is strangury, bloody, scanty urine, with odor of violets; there may be purging; cyanosis; dilated pupils; stertorous breathing; dry, moist skin; feeble, rapid pulse; coma; collapse.

Somewhat resembles poisoning by Opium.

TREATMENT:

1. **Evacuate the stomach if seen promptly;** syphon out the stomach thoroughly with a stomach-

tube, using plenty of water. May give emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting. Give Magnesium Sulphate —Epsom Salt—(1 to 4 tablespoonfuls in a cupful of water) during syphoning or before emetic effect is over.

2. **If bowels have not moved freely, give enema,** also Magnesium Sulphate (1 to 2 tablespoonfuls in water). **Apply hot fomentations to loins.**

3. **Give much water and demulcents** (such as white of egg, milk, oil, gum arabic, flaxseed or elm tea, barley or starch water, oatmeal gruel, gelatine, **flour and water,** or even crushed bananas).

4. **Give stimulants;** as in Savine (q. v.).

5. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours by mouth, or ½ teaspoonful in gruel by rectum as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

TYROTOXICON.

(See Fish Poison and Ptomains).

URETHAN.

HISTORY:

Death by asphyxia.

SYMPTOMS:

Vomiting; reduced temperature and heart action; muscular weakness; general anesthesia.

TREATMENT:

1. **Evacuate the stomach**; syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in two tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Cupric Sulphate (3 to 5 grains in 2 tablespoonfuls of water every 5 to 10 minutes until it acts), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful doses hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours) and Atropine Sulphate (1/120 to 1/60 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

VEGETABLE AND ANIMAL PROTEINS

(Such as Poison Thru Being Inhaled)

Vegetable Proteins from the pollen of: Ragweed, Rose, Sunflower, Golden Rod, Lilac, various weeds, grasses, etc.—Animal Proteins from epithelial scales, scales of the hair, feathers, etc., of Cat, Cow, Dog, Horse, Hog, Sheep, Canary, Parrot, etc.

HISTORY

The acute annual or occasional poisonings due to the inhalation mainly of the plant proteins are commonly known as "Annual Asthma," "Seasonal Asthma," "Hay Asthma," "Hay Fever" (Pollinosis), "Rose Fever," "Rose Cold," "June Cold," "July Cold," "Peach Cold," "Summer Catarrh," "Autumnal Catarrh," "Nervous Catarrh," "Nervous Coryza," "Cold in the Head," "Pollen Poisoning," etc.

The more or less irregular or occasional poisonings, which appear to be due to the inhalation of animal proteins, is called "Animal Asthma," "Cat Fear," etc.

Proteins are formed mainly by plants, but there are no essential differences between the animal and the vegetable or plant proteins. All of the proteins contain carbon, hydrogen, nitrogen and oxygen; some contain also sulphur, phosphorus, or iron.

Plant pollen, practically protein, is a fine dust-like powder or spherical or ellipse-shaped, grain-like substance formed within the anthers (the double-celled sacs of the stamens) of flowers. It is the fertilizing or male element in flowering plants; and nature provides that at the proper time is shall be transferred from the plant anthers to the stigmas, a part of the pistils or seed-bearing organs of the higher flowering plants. It is dusted upon the sticky surfaces of the stigmas or otherwise so placed as to reach the ovaries and the ovules. This constitutes the fecundating or fertilizing process called pollination.

The pollen, representing the male element of the plant, is conveyed, ordinarily, to the ovary and ovules, representing the female element of it, either by the feet of insects or by the wind. Nearly all perfect flowers i.e., those which contain both elements, are either bright colored or white; they have a pleasing odor, yield honey, and give but a small amount of pollen, much of which, as a rule, is carried by the feet of bees and various other insects from the stamens to the pistils of those plants. The flowers of the other kind of plants, among which are various orchard and other grasses and many weeds, are not bright colored, and have no appreciable odor and no honey. They release a large quantity of very fine, light pollen which is carried by the air and wind from the stamens of the male to the pistils of the female of those plants. This pollen may fill the air at a distance from the plants, having been wafted thither by the wind. Thus, one susceptible to its effects, may, upon inhaling it, be poisoned by it at some distance from where it grew, its protein being more or less soluble in the secretions of

nose, eye, etc. Pollen not air-borne, as that of the rose and golden rod, may poison thru the handling and smelling of the flowers, thus causing the characteristic hay-fever type of poisoning, or pollinosis.

In the blood and tissue cells of most persons are anti-bodies, or substances which neutralize these poisonous proteins when they enter the body; therefore such persons are said to be immune to these poisons. But some persons are sensitive or "sensitized" to certain of these poisons, therefore not immune to them, but more or less poisoned if exposed to them, and they enter into the body by inhalation, etc. These protein poisonings appear to be closely related to the protein poisonings produced in some persons upon eating the meat of certain animals, or the flesh, or eggs, of certain fowl, birds or fish, or upon their eating certain cereals, vegetables, fruits, nuts, etc. (See page 149). All of these proteins are related to the proteins of snake venom and of certain arrow poisons, and of poisonings by bacterial proteins.

Some persons seem to be immune to the various plant pollens but are not to the hair-scales of some certain kind of domestic animal, or to the feather-scales of some such bird as the parrot, canary, or the sparrow; others are immune to many of the plant pollens, such as those of the orchard grasses, roses, lilacs, etc., but are not to golden rod, or to rag weed, or to some other plant which flowers at the same time of the year as one of these. It appears, therefore, that the individual immunities, or the lack of such, to the various poisonous proteins, vary greatly in character, extent and degree; sometimes it is very difficult to determine, particularly among plant pollens, the protein or proteins, causing the individual poisoning, inasmuch as such may occur under obscure or very confusing conditions.

Most cases of the "hay fever," "hay asthma," or pollen poisoning type occur, usually, between May and October in temperate zones, as during that time, in a region rich in vegetation, the air is more or less laden with the fecundating dust. Most persons who are affected are attacked between the 12th and the 20th of August and the attack is likely to last until a severe frost occurs in September or October. However, some persons are attacked in June or July, when certain orchard and other grasses ripen and the haying season approaches. The presence or handling or smelling of roses or certain other flowers may cause coryza, sneezing and dyspnoea in some persons at almost any time of the year. Some persons employed in greenhouses or handling flour, etc., freely in bakeries show the poisoning effects. It is notable that if a person who is affected by the pollen of a certain plant or plants goes at the time of pollination to a region where there are none of these plants he is not likely to have an attack of the poisoning.

SYMPTOMS

The general symptoms in "hay fever," "hay asthma," or pollen poisoning are about as follows: There is a sense of dryness, also of irritation—such as tingling, itching or stinging, in the nose; this is followed by paroxysms of sneezing, more or less violent; the eyes are

suffused and there is a copious flow of serum and mucus from the nose; there may be headache, flushed face, feverishness, a sense of fulness in the head and of constriction over the eyes. Later on there may be such swelling of the mucous membrane of the nasal passages as to almost completely block them, and the membrane may be very sensitive, even painful, also "water-soaked." If the nasal discharge continues some time it may become distressingly profuse as well as sharp and irritating to the nasal openings and to the upper lip; this results in redness, sensitiveness, excoriation and cracking of the skin over which the fluid spreads, which is also aggravated by the frequent efforts to wipe it away. Breathing may be labored and the sufferer becomes impatient and irritable; he is more or less feeble and miserable, and finds himself quite unfit for the cares and responsibilities of daily life.

Symptoms in "cat fear," or "animal asthma," etc.: Some persons experience much nervous excitement, with perhaps a choking or suffocating sensation in the presence of certain domestic or other animals; this may occur even from merely entering a room or place recently occupied by such animal. It appears that the effects, either way, is due to the proteins of the epithelial scales, hair-scales, or other scales cast off by or issuing from the animal. These proteins floating in the air and inhaled or similarly incorporated by a sensitized person poison him. It then is not a hysteria but a nervous disturbance of a toxic character. Such a disturbance may also be referable to the scale-proteins from the feathers or skin of a bird, such as a parrot, or a canary, or a sparrow, etc., or to epidermal, hair-scale or other proteins from other creatures. The disturbance may range from a simple aroused consciousness or sense of aversion, antipathy and dread with excitement, to great irritability, roughened skin, chills, cold perspiration, nausea, vomiting, diminished heart action, difficult breathing, a sense of choking or smothering, air-hunger, etc.

TREATMENT

Ordinarily, the most successful method of identifying the respective poisonous protein or proteins, and definitely treating the actual cause, is to vaccinate the afflicted individual with solutions or extracts of various suspected proteins until the wheal-like, inflammatory skin reactions indicate the poisonous protein or proteins. These vaccinations are made into the skin. When the identification is complete, the individual is therapeutically (hypodermically) inoculated with graded doses of an extract or solution of the pollen or other offending protein, given at certain intervals, usually one to three times a week, for several weeks. To determine the degree of sensitiveness scratches are made on the skin and to these is applied a 25%, 10% or even weaker dilution of the vaccine until just that dilution which gives no definite reaction is determined. That is to be the first phyodermic dose injecting a few drops only. Subsequent injections are of a few more drops and later a stronger dilution. These injections (therapeutic inoculations or vaccinations) stimulate the formation in the body of certain anti-bodies or neutralizing agents, which gradually become numerous and strong enough to successfully antagonize or overcome the assaults and injurious effects of the poisonous protein or proteins. Much skill and also good judgment is required in the successful interpretation of the various skin reactions and in the judicious em-

ployment of the therapeutic or curative vaccinations. Commonly, in a pollen poisoning, it has been found advisable to repeat these therapeutic measures the next year, about two months before the beginning of the flowering season or pollination of the plant or plants causing the poisoning, as a precaution against a return of the affection.

In testing (by vaccinating) to determine the animal or bird protein causing the poisoning, the use of an emulsion or solution made from the dust of a room or place occupied by an animal or bird which it is suspected may be the cause, or made from the hand soilings resulting from stroking it, may afford the necessary information by showing whether such animal or bird is the source of the protein poisoning, i.e., of asthmatic-like attacks: and if so the necessary therapeutic (hypodermic) vaccination may then be instituted. The proper preparation of the various protein extracts requires much care and the best in the market is quite expensive. An antitoxic serum called pollantin has been prepared by injecting horses with pollen protein from certain plants. It is used by introducing one drop into the outer angle of each eye and one or two drops into each nostril each morning before rising. It has afforded temporary relief.

Among other methods of relief in the "hay fever," "summer cold," "cold in the head" and asthmatic type of protein poisonings are the following: Various sprays of a neutralizing, alkaline, antiseptic or anodyne character, including boric acid, sodium salicylate, menthol, resorcin, hydrogen peroxide, Dobell's, and Seiler's solutions, etc. A solution of cocain, two to five grains, to the ounce of rose water, with or without ten grains of antipyrin, is helpful; but the cocain habit is easily induced. In uric acid conditions small doses daily of lithium and sodium, potassium, or magnesium salts, with dieting are beneficial. Hypercrophies, polypi, etc., must be remedied also.

For excessive nasal secretion and obstruction, a spray of suprarenal extract, a dram in an ounce of Dobell's solution. A mixture of the fluid extracts of white pine bark and witch hazel, two drams of each, and of calendula one dram, in two and one-half ounces of liquid albolene as a nasal spray, used every three or four hours, affords considerable relief. Camphor and menthol rubbed up together (without heat), each one dram, in liquid albolene, two and one-half ounces, used as a spray, likewise relieves. Capsules or tablets, each consisting of morphin 1/12 grain, atropin 1/500 to 1/300 grain and caffein 1/4 grain, given every two to four hours, relieve much. The morphin relieves the pain and irritability; both it and the atropin diminish the excessive secretions, and all three improve the circulation and afford rest. Hoffman's Anodyne, and spirit of chloroform, help some persons. A hypodermic injection of three to four minims each of adrenaline solution (1 to 1,000) and pituitrin, may be given if there is not too great vascular tension; it usually affords prompt and intense relief. The inhaling of vaporized benzoin, camphor, etc., or inhaling the fumes of potassium nitrate, stramonium or belladonna, lobelia, oolong tea or coffee each by itself or in combination with one or more of the others sometimes affords great relief in paroxysms. Various tonics and stimulants, arsenic, strychnin, etc., also various sedatives and oxygen, may be found useful.

VENOM (See Snake).
VIRUS (See Rabies).

VASELIN OR PETROLATUM.

Vaselin or Petrolatum is sometimes taken or given to children for colds or various lung affections. Large doses of the latter may produce unfavorable symptoms.

SYMPTOMS:

If unfavorable symptoms occur, may be cramps in lower extremities; severe, persistent vomiting; collapse.

TREATMENT:

1. **Evacuate the stomach if vomiting is not free;** syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoonful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting.

2. **Stimulate heart, circulation, and respiration** with Brandy or Whisky (2 teaspoonful doses every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently), or with Aromatic Spirit of Ammonia (a teaspoonful in a little water every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently); also with Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours), and Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Tincture of Digitalis (30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin

(1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee may also be given.

VERATRUM—VERATRUM ALBUM (WHITE VERATRUM, WHITE HELLEBORE)—VERATRUM VIRIDE (GREEN HELLEBORE) — VERATRINE — SABADIILA — CEVADIN — ZYGADEMUS (DEATH CAMAS).

HISTORY:

Usually taken by mistake. Veratrine sometimes used to commit murder. 1/16 grain Veratrine has caused dangerous symptoms. Death in 1 to 5 hrs. or several days. Recovery from 4 grs. Veratria.

Death by paralysis of respiratory centres.

SYMPTOMS:

Burning and pain in alimentary canal; great muscular relaxation; fear; inability to swallow; nausea; vomiting; diarrhœa; palpitation of heart; pulse slow, thready; respiration labored; sight lost, pupils, usually dilated; intense itching; may be convulsions.

TREATMENT:

Keep patient in horizontal position, with head lowest, and provide plenty of fresh air.

1. **Evacuate the stomach unless vomiting has been free, from action of drug itself**; syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, use an emetic, such as Zinc Sulphate (20 grains in 2 tablespoonfuls of water, repeated in 15 minutes if vomiting is not produced), or Mustard (a tablespoonful in a small cupful of water, repeated in 15 minutes if not effective), or Ipecacuanha (Powdered Ipecacuanha, 30 grains; or Syrup of Ipecac, a teaspoon-

ful every 10 to 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 minutes until effective). After giving emetic, always give plenty of luke-warm water to encourage vomiting. Give in syphoning fluid or before vomiting ensues, **Tannic Acid** (30 grains in 2 tablespoonfuls of water), or Iodine (1 to 2 grains) and Potassium Iodide (5 to 10 grains), or strong tea, or a decoction of oak bark (½ oz.); or Pot. Permang. (10 to 15 grs. in a pint of water), to oxidize alkaloids.

2. **Stimulate** with hypodermic injections of Sulphuric Ether (10 to 15 minims), or with Brandy or Whisky (2 teaspoonfuls every 10 to 15 minutes, or ¼ teaspoonful hypodermically as frequently). Give Aromatic Spirit of Ammonia (a teaspoonful in water every 10 to 15 minutes, 3 or 4 times, to stimulate and prevent the alkaloids forming soluble chlorides. Strychnine Sulphate (1/60 to 1/20 grain hypodermically every ½ to 2 hours), Atropine Sulphate (1/120 grain hypodermically every ½ to 2 hours), or Tincture of Belladonna (20 drops in water every ½ to 2 hours). Or to support: Tincture of Digitalis (30 drops by mouth, or half as much hypodermically, every ½ to 2 hours), or Digitalin (1/100 grain hypodermically every ¼ to 1 hour), or Caffein Citrate (1 to 4 grains every ¼ to 1 hour), and inhalations of Amyl Nitrite (a 3 or 5 minim pearl crushed in a handkerchief and inhaled, using one every ¼ to 1 hour if necessary), may be used for the same purposes. Draughts of strong coffee by mouth or rectum help; also Strophanthin (hypod.) 1/120 grain.

3. **Employ artificial heat** (such as hot water bottles or ordinary bottles containing hot water, or bags of salt, bricks, plates, or stove-lids, heated, applied to the feet and sides of the body), to maintain bodily temperature.

Give Hyoscin with Opium (see 4) as a sedative, and Ergot (hypod.) to strengthen circulation.

4. **Give Opium** (Powdered Opium, 1 to 2 grains every ½ to 2 hours), or Laudanum (20 drops every ½ to 2 hours, or ½ teaspoonful in gruel by rectum

as frequently), or Morphine Sulphate (¼ grain by mouth or hypodermically every ½ to 2 hours), to relieve pain and nervous irritability.

5. **Apply electricity** over the heart, and resort to artificial respiration if death is threatened from embarrassed respiration (rhythmically raising and lowering arms from straight at sides to up over head and back again, 18 times a minute).

VERMIN KILLERS.

(See Arsenic, Phosphorus, Strychnine, Mercury, etc.).

VOLATILE OILS: OIL OF CEDAR, ETC.

(Treat as in Savine poisoning.)

WOORARA.

(See Curare).

WHITE PRECIPITATE.

(See Mercury Compounds).

WOUNDS, POISONOUS (POST MORTEM, DISSECTING, ETC.).

SYMPTOMS:

Pain; swelling; inflammation, perhaps fever.

TREATMENT:

Wash under stream of water, suck out the poison, cauterize and apply antiseptic solution. May paint over and around wound with Tincture of Iodine. Dress antiseptically with Boric Acid, Carbolic Acid, Bichloride of Mercury or similar solution.

ZINC COMPOUNDS: ZINC CHLORIDE—ZINC SULPHATE (WHITE VITRIOL)—ETC.

HISTORY:

The Chloride used in embalming, as disinfectant and by tinsmiths, is corrosive, and the commonest cause of dangerous symptoms.

Fatal dose: abt. 1 dr. of Chloride; ½ to 1 oz. of Sulphate. Fatal results from the Chloride in 4 hrs. Infrequency of fatal result from Zinc Sulphate is

due to its usually being expelled by vomiting. Death in 4 hrs. to 4 months.

SYMPTOMS:

Corrosion of lips and mouth; pain or burning in throat, stomach and bowels; nausea; incessant vomiting and vomit blood stained; pulse and respiration increased; dyspnœa; pupils dilated; convulsions; paralysis; coma; death. [N. B. Only Chloride corrodes.]

TREATMENT:

Antidotes: Albumin, soap, alkaline carbonates, and mucilage.

1. **Evacuate the stomach,** if free vomiting has not already occurred: syphon out the stomach with a stomach-tube, using plenty of water. If a stomach-tube is not at hand, tickle throat with finger or feather and give tepid water freely; may cautiously use an emetic, such as Ipecacuanha (Powdered Ipecacuanha, 15 to 30 grains; or Syrup of Ipecac, a teaspoonful every 15 minutes until vomiting results), or Apomorphine Hydrochlorate, hypodermically (1/10 grain, repeated every 15 to 30 minutes until effective).

In severe corrosion or marked tendency to vomit, avoid emetics. Syphonage and medicated water serviceable. For persistent vomiting give ice or cautiously small doses of Cocaine.

N. B.—Put Sodium or Potassium Carbonate or Bicarbonate (½ ounce) in water used in syphoning to form the insoluble Zinc Carbonate, or give it in water after emetic to assist emetic action, etc.

2. **Give freely white of egg in water or milk. Give Tannic Acid or Gallic Acid** (30 grains in 2 tablespoonfuls of water), or give strong tea, or a decoction of oak bark (½ oz. to a cupful of water).

3. **Apply linseed meal poultices to the abdomen,** and if much pain, give an enema of starch or gruel and water. Give mucilaginous drinks, such as gum arabic or gum tragacanth water or flaxseed tea.

4. **Give Opium** (As directed under Veratrum).

5. **Give Stimulants for collapse.**

Key to Principal Poisonous Plants, Etc.

A.—Aconite (Aconitum Napellus) Monkshood; Wolfsbane. 1. Stem (flowering). 2. Pistil. 3. Stamens. 4. The two recurved nectaries.

B.—Belladonna (Atropa Belladonna) Deadly Nightshade: Death's Herb; Poison Black Cherry. 1. Stamens. 2. Style. 3. Stigma. 4. Berry and seeds. 5. Berry. 6. Stem.

C.—Hyoscyamus (Hyoscyamus Niger); Henbane; Poison Tobacco; Insane Root. 1. Flowering stem. 2. Corolla.

D.—Stramonium (Datura Stramonium) Thorn. Devil's, or Mad Apple; Jamestown Weed. 1. Fruit shown in section. 2. Stem.

E.—Sanguinaria (Sanguinaria Canadensis) Bloodroot; Indian Red Paint. Puccoon.

F.—Physostigma (Physostigma Venenosum); Calabar Bean; Ordeal Bean. 1. A flowering branch. 2. Pistil (half of calyx removed). 3. Terminal part of style and appendage. 4. Appendage (trans. sec.). 5. A pod. 6, 7. Seeds. 8. Dry seed (trans. sec.). 9. Base of cotyledon, showing plumule and radicle.

G.—Cannabis (Cannabis Sativa); Hemp; *Var.* American Hemp (Cannabis); Indian Hemp (Cannabis). 1. Pistillate inflorescence. 2. Staminate. 3. Flower.

H.—Castor Oil Plant (Ricinus Communis); Palma Christi. 1. Stamens. 2. Anther. 3. Stigmas. 4. Capsule (transverse section). 5. Seed. 6. Embryo.

I.—Cherry Laurel (Prunus Laurocerasus). Branch, fruit and flowers.

J.—Coca (Erythroxylon Coca). Flowering branch.

K.—Colchicum (Colchicum Autumnale); Meadow Saffron. 1. Capsule (closed). 2. Capsule (open). 3. Styles. 4. Capsule (transverse section). 5. Seed.

L.—Conium (Conium Maculatum); Hemlock; Poison Hemlock; Beaver Poison; Water Parsley.—Cicuta. 1. Fruit (vertical section). 2. Fruit (transverse section). 3. Fruit. 4. Flower. 5. Stem (flowering).

M. Digitalis (Digitalis Purpurea); Purple or American Foxglove; Lion's Mouth; Fairy Fingers; Dead Men's Bells.

N.—Gelsemium (Gelsemium Sempervirens); Yellow Jasmine; Woodbine; Evening Trumpet Flower. 1. Branch (flowering). 2. Calyx and Pistil. 3. Corolla and Stamens. 4. Fruit. 5. Branch (fruiting).

O.—Lobelia (Lobelia Inflata); Wild or Indian Tobacco; Emetic Weed; Asthma Weed. 1. Branch (flowering). 2. Flower. 3. Capsule.

P.—Common Mushroom (Agaricus Campester); Edible Mushroom; Meadow Mushroom. 1. Three young plants. In one, veil just separated from margin. 2 and 3. Caps partly expanded, gills still pink (later black). 4. Mature plant, cap fully expanded, gills blackish brown. 5. Vertical section of cap and upper part of stem of immature plant. 6. Same. of mature plant. 7. Four spores × 200+. Fig. 8. Variety: Hortensis—immature plant. 9. Mature. 10. Four spores × 200+.

Q.—Poison Amanita, Death Cup (1 to 4. Amanita Phalloides). 1. Plant with whitish cap partly expanded. 2. Fully expanded. 3. Mature plant (vert. sec.). (5 to 7. Amanita Verna.) Vernal Amanita. 4. Young plant just emerging from wrapper. 5. Immature plant with cap partly expanded. 6. Same, fully expanded. 7. Four spores × 200+; (poisonous).

R.—Fly Amanita (Amanita Muscaria); Fly Mushroom; (poisonous). 1. Young plant just breaking from its wrapper. 2. Plant with red cap partly expanded. 3. Mature plant, cap fully expanded and faded to yellow on striated margin. 4. Vertical section of part of cap and upper part of stem. 5. Four spores × 200+.

S.—Nux Vomica (Strychnos Nux Vomica); Vomit or Poison Nut; Dog Poison; Ratsbane; Ordeal Root. 1. Branch (flowering). 2. Corolla (opened). 3. Calyx and Pistil. 4 and 5. Ovary. 6. Fruit. 7. Fruit (cross section). 8–10. Seed.

T.—Poke (Phytolacca Decandra); Poke Weed, etc. 1. Branch. 2. Fruit (single showing carpels).

U.—Poppy, Opium Poppy (Papaver Somniferum); Thebaica. 1. Ovary (with some stamens remaining). 2. Ripe Capsule. 3–4. Seeds. 5. Branch. 6. Capsule open.

V.—Rhus { Rhus Radicans, / *Var.*: Rhus Toxicodendron } Poison Ivy; Poison Oak.—(Rhus Vernix, Poison Sumach.)

W.—Tobacco (Nicotiana Tabacum). 1. Plant in flower. 2. Capsule. 3. Ripe capsule opening at top. 4. Capsule (transverse section).

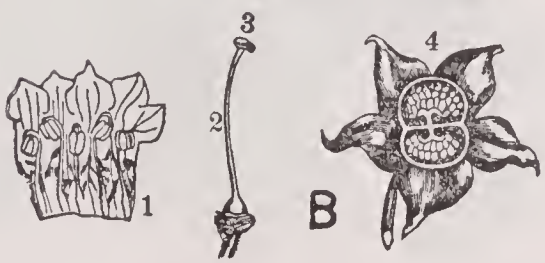
X.—Veratrum Viride (Veratrum Viride); American Hellebore; Devil's Bite; Indian Poke; Itch Weed; Bugbane. 1. Root. 2. Flower.

Y. Spigelia (Spigelia Marilandica); Pink Root. 1 Flowering stem. 2. Corolla (opened). 3. Ovary with part of style. 4. Fruit and calyx. 5. Same (one cell opened). 6. Ovary (trans. sec.). 7. Root stock and stem.

Z.—Strophanthus (Strophanthus Hispidus). Illustration: seed with comose awn.

PRINCIPAL POISONOUS PLANTS, ETC

Referred to in foregoing. (See page 224.)
Unaccompanied by names, as identification test.



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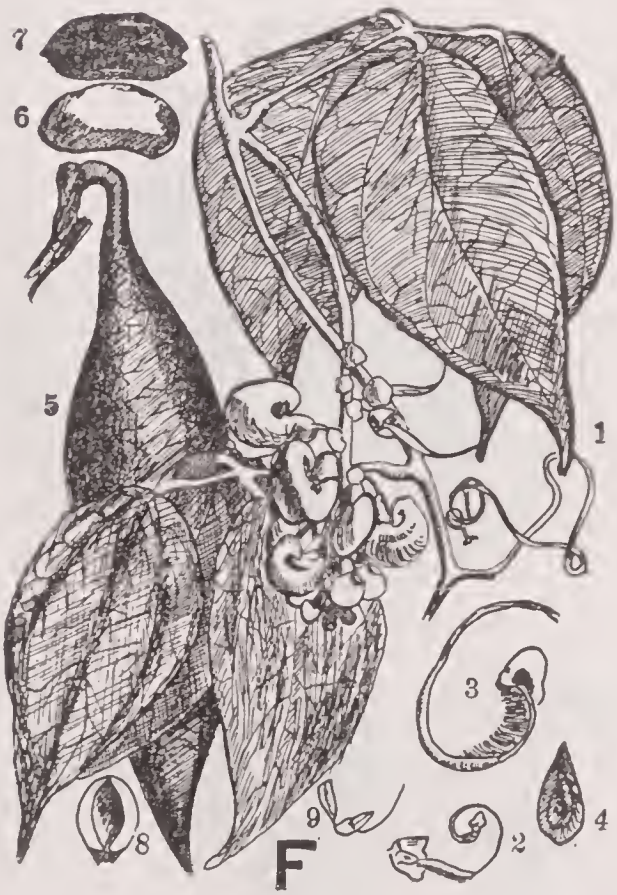
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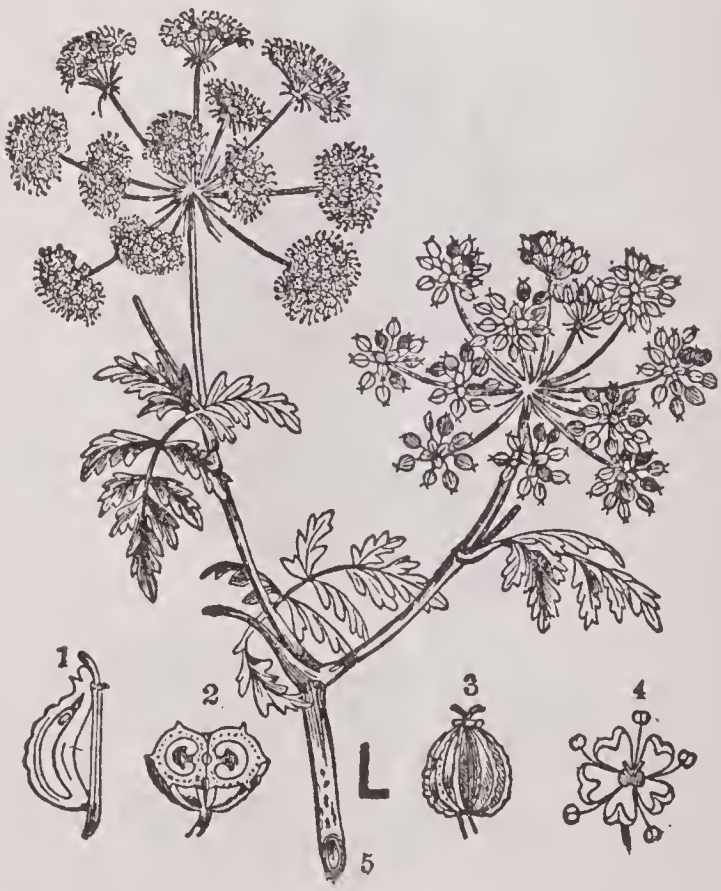
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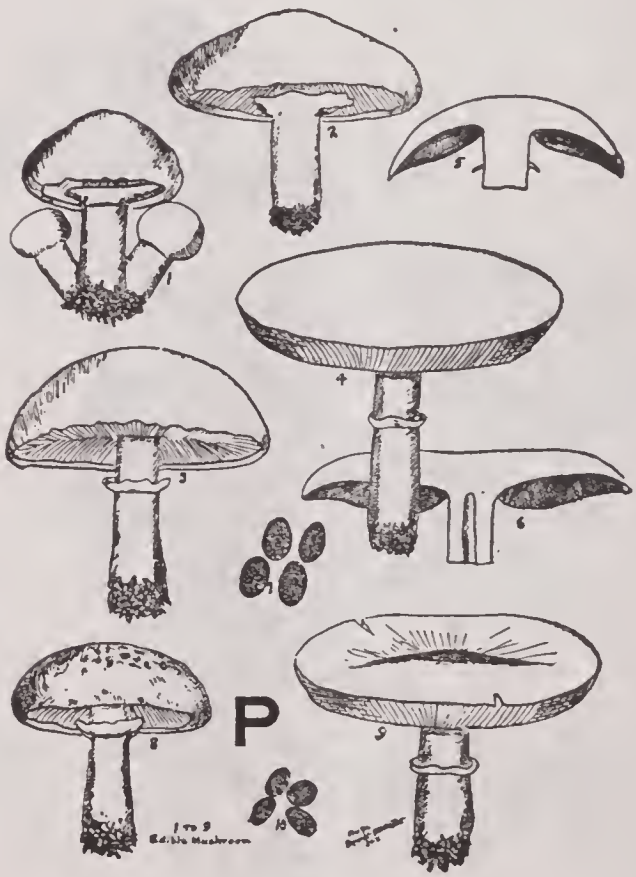
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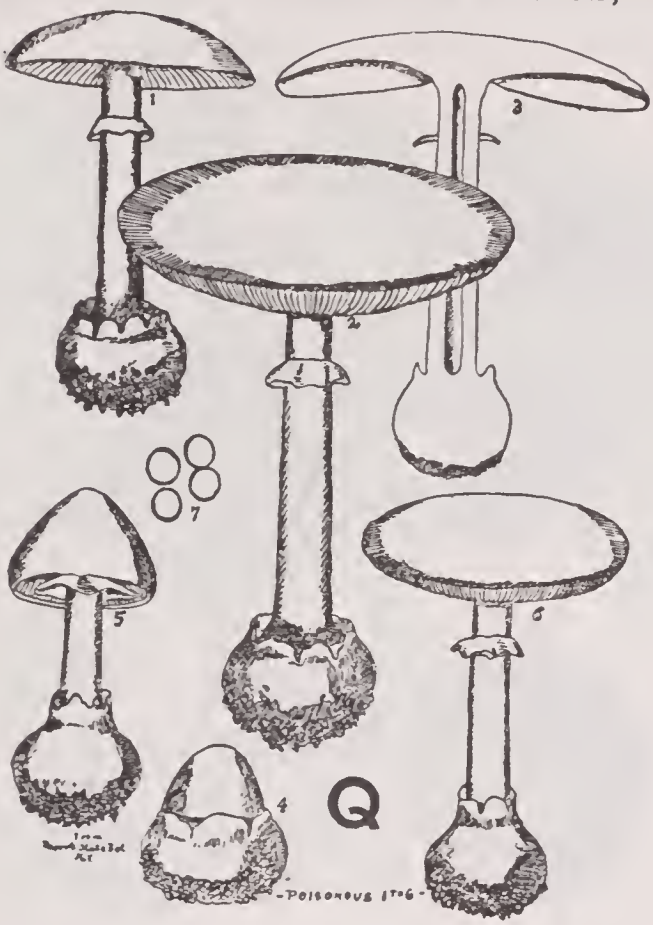
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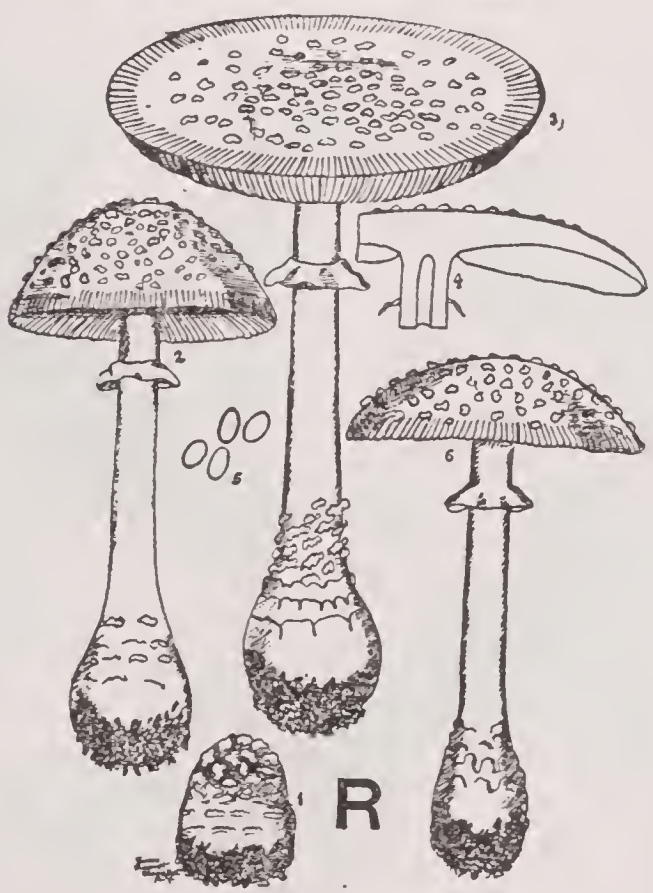
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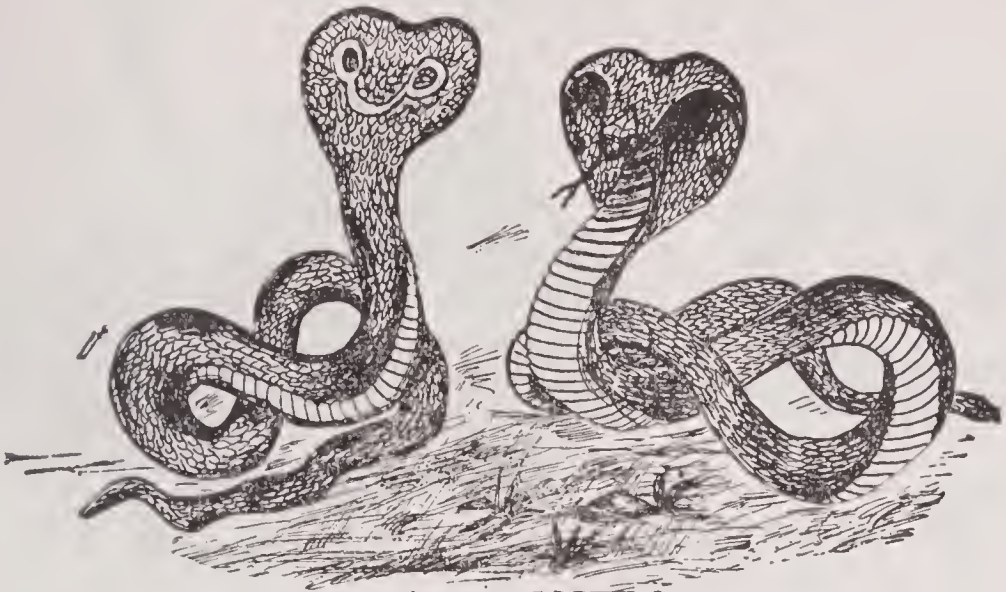


COBRA DE CAPELLO

FER DE-LANCE

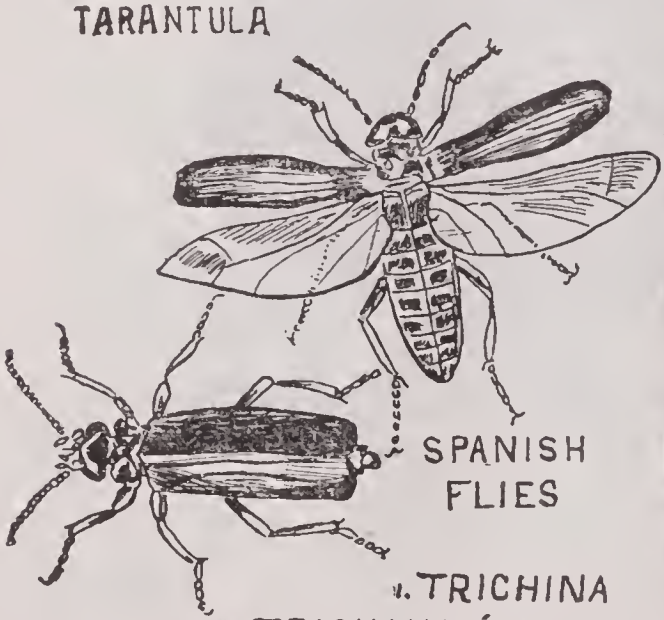
HEAD OF RATTLESNAKE
(1 Nose 3 Eye 5 Fang
2 Pit 4 Poison gland)

RATTLESNAKE

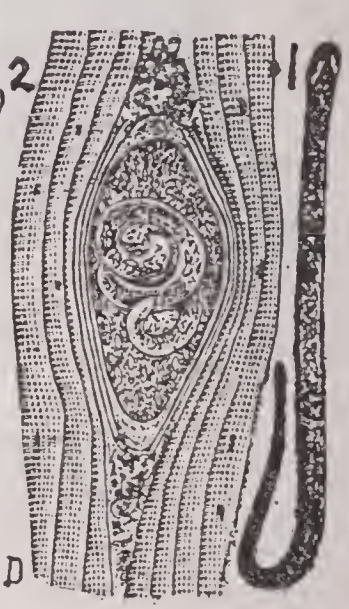
RATTLE OF RATTLESNAKE
(SNAKE 14 YRS OLD)

TARANTULA

SCORPION



SPANISH FLIES



1. TRICHINA
2. TRICHINA, ENCYSTED

KEY TO CONSTITUENTS
of
Various Patent, Proprietary and General Preparations

[**Note!** The KEY is indicative of the reported, reputed, proved or probable, present or previous, active or otherwise important, ingredient or ingredients of the respective preparation, as shown in the parenthesis following its name.

It should be noted, that proprietors of some preparations have been in the habit of varying certain of their formulas; also that not very long before or shortly after the passage of the Harrison Narcotic Law, or other restrictive measures, the proprietors of certain preparations quite materially modified some of their formulas. However, a poisoning might occur from a preparation secured before such change in formula and kept for a long time before being used.

The analytical findings conducted for, or under the auspices of, or otherwise reported by, or through the American Medical Association, the British Medical Association, The Druggists Circular, The American Druggist, The Western Druggist, The National Druggist, The Medical World, The Medical Record, The American Journal of Pharmacy, and other sources of information such as Beasley's Druggists' Receipt Book, Street's Patent and Proprietary Medicines, Oleson's Secret Nostrums and Systems of Medicine, Reports of the New York, Massachusetts, New Hampshire, Kansas, Indiana, Louisiana and other boards of health, etc., have been carefully consulted in this compilation; quite recently and most serviceably, also, Nostrums and Quackery, Vol. II. (pub. 1921), by Dr. Arthur J. Cramp, Director, Propaganda Department and Bureau of Investigation, of the Journal of the American Medical Association.

The Key is intended to serve as a guide to procedure in real or fancied emergency (e. g.: when a small child has swallowed a large quantity of a presumed potent liniment or other preparation, it is helpful to have information regarding the ingredients; etc.) Upon reference to the Key it may be apparent that: certain preparations, commonly supposed to be potent, or harmful, are not so, at least not now, and perhaps were never found to be so; or, that a certain mineral water or salt is chemically unsuited for use in the specific emergency; etc. The attendant upon a case of supposed poisoning must painstakingly determine if such a condition truly exists, and if so, its probable cause, then treat accordingly.]

Anesthetics (Local).—They commonly contain or consist of one or more of the following: Cocain, novocain; eucain; carbolic acid with camphor and alcohol; or similar agents.

Asthma, Hay Fever, Catarrh, etc.; "Cures," "Specifics," etc. Commonly one or more of: Opium, cocain, stramonium, hyoscyamus, Indian hemp, belladonna, etc.

Agnew's Catarrhal Powder [Anglo-American Catarrhal Powder] (cocain, boric acid, menthol, sodium benzoate, sodium bicarbonate).

Ascatco (Opium-arsenic preparation, etc.)

Az-Ma-Syde (cocain 4.5 gr. per fluid oz., odor of thymol, wintergreen, phenol). [Tablets: acetanilid.]

Birney's Catarrh Powder (cocain, hydrochl., 1⅞%; menthol, eucalyptol; sodium benzoat; sodium bicarb.—Conn. Rept., 1909).

Blosser's Catarrh Remedy (chamomile flowers, aniseed, cubeb and pepper—1912.)

Brodie's Liniment for Asthma (oils of stillingia, cajeput, lobelia; alcohol).

Electric Catarrh and Asthma Cure (cocain).

Hair's Asthma Cure (potassium iodid).

Haye's Asthma Cure [7 remedies] ("No. 781": oils of turpentine, peppermint, etc.) ; ("T. I. Q.": iodids).

Himrod's Asthma Cure [or Powder] (lobelia, 2 oz.; stramonium leaves, 2 oz.; saltpeter, 2 oz.; black tea, 2 oz. All powdered).—Oleson 1903 (quoting "Covert".)

Jayne's Asthma Remedy (saltpeter, powd. belladonna or stramonium leaves, veg. matter).

Lane's Catarrh Cure (phenol, salt).

Lenox Catarrh Cure (alum, zinc sulphate, lead acetate; pot. permang.)

Nyal's Catarrhal Balm (chlorbutanol, 2 grs.; lanolin, menthol, oil eucalyptus—Idaho San. Insp. Rept., 1912.)

Rexall Catarrh Jelly (mfr. claims camphor, menthol, eucalyptol—Street.)

Rexall Catarrh Tablets (mfr. claims: boric acid, thymol, menthol, eucalyptol, benzoic acid.—Street).

Ruby Catarrh Powder (cocain—Mass. Bd. Hlth., 1908).

Sage's Catarrh Remedy (golden seal, borax, salt, phenol)

Schiffman's Asthma Remedy (pot. nitrate, leaves of stramonium, belladonna, mullein, etc.)

Stello's Asthma Cure (Indian hemp, potassium iodid).

Tucker's Asthma Specific (Cocain, potassium nitrate). (Varied—another, later analysis: Atropin sulphate, sodium nitrate.) [As "Cure" (cocain).]

Cancer Pastes.—(Commonly: arsenic, with or without zinc sulphate or chloride; or chromic acid; or antimony chloride).

Cancer "Remedies," "Cures," etc.—Some "cures" have been found to contain one or more of: Cocain, opium, strychnin, cresol, phenol, potassium iodid, methyl salicylate, acetanilid, thymol, hyoscyamus, etc. Some have proved to be pure deceptions, the ingredients being inert.

Cancerine (alcohol, etc.)

Cancerol (opium, alcohol).

Curry Cancer Cure [14 preparations]. (Among them, a "White Solution"—4% cocain; a "White Powder"—25% acetanilid; "Liquid Poppy"—opium; "Wash" & "Tonic(s)"—9% to 20% alcohol.)

Miller's Cancer Cure (acetanilid).

Mixer's Cancer and Scrofula Syrup [In 7 packages] ("Syrup," potassium iodid, methyl salicylate, alcohol, etc.), ("Cancer Paste," camphoraceous oils, hyoscyamus-like or belladonna-like substances).

Cosmetics and Related Preparations.

Absorbit (acid boric, magnes. carb., calcium carb., alum).

Amarol (epsom salt, 90%; borax 10%).

Anti-Freckle Lotion (corrosive sublimate, 1½%; alcohol, 2%; water, 96½%).

Berry's Freckle Ointment (ammoniated mercury, 12%; zinc oxid, 0.7%—1912).

Bradford's Enameline (zinc oxide).

Mrs. Bradley's Face Bleach (corros. sublim., 23½%; common salt, 9½%; magnes. sulph., 45½%).

Calocide Compound (alum, borax, tannic acid, common salt).

Captol (chloral, tannic acid, tartaric acid).

Cerol (borax, stearic acid).

Dr. Charles Flesh Food (zinc oxid, 2%; acid stearic, 1 1/6 %; vaseline, 51%; starch, 38½%).

Circassian Cream (corrosive sublimate).

Clearola (sulphur).

Complexion Powder (bismuth, subcarbonate).

Curticle Acid (acid oxalic, 2%; alcohol 10%; water).

Delol (barium sulphate and sulphide, sulphur, calc. carb., zinc oxid, starch—Ind. S. B. Hlth.)

Eugenie's Favorite (lead carbonate).

Flake White (lead carbonate).

Flowers of Oxzoin (zinc oxid, 15½%; glycerine, 16½%; rose water, 68%;—variations).

Freckeless (ammoniated mercury) [white precipitate, "a powerful caustic poison"] (12% bism. subnit., 10% vaseline).

French's Grease Paint (calcium and zinc oxide).

Gouraud's Oriental Cream (calomel).

Hagan's Magnolia Balm (zinc oxide).

Hill's Freckle Lotion (corrosive sublimate).

Kalydor (potash, mercuric chlorid).

Kingsbery's Freckle Lotion (corrosive sublimate).

Kingsbery's Freckle Remover (corros. sublim.)

Kintho Beauty Cream (ammoniated mercury, bismuth subnitrate, borax).

Lac Virginis (benzoin).

Laird's Bloom of Youth (calcium, zinc oxid).

Magic Face Lotion (boric acid, alcohol, 6.4%).

Malvina Lotion (corrosive sublimate, zinc carbonate, emulsion of almonds).

May-A-Tone (borax 3 to 25%; epsom salt, 50 to 97%).

Mercolized Wax (ammoniated mercury, 10%; zinc oxid, 10%; petrolatum or paraffin base, 80%).

Mme. Ruppert's Face Bleach (corrosive sublimate, 2/5%; benzoin; alcohol).

Milk of Roses (mercuric chlorid).

Neroxin (borax, 55%; soap, 25%).

Othine (ammoniated mercury, 11.5 to 23%; bismuth subnitrate, 7½%).

Pearl White (bismuth subnitrate).

Perspiro [similar to the old Thiersche's Powder] (acid salicylic, gr. 10; acid boric, dram 1½).

Pimple Lotion (carbolic acid, tannic acid).

Phillip's Face Lotion (methyl, i.e., wood alcohol, 11%; ethyl, i.e., grain alcohol, 38½%; etc.)

Rexall Tan and Freckle Lotion (corros. sublimate).

Riker's Face Powder (calcium, zinc carbonate).

Saunder's Face Powder (zinc oxid).

Snow White Enamel (lead carbonate).

Snow White Oriental Cream (lead carbonate).

[Note: Many face powders are composed chiefly of a starch, such as rice, wheat or potato starch, and of a talcum powder; these are perfumed and tinted a rose color. Some contain zinc oxide or bismuth oxychloride or some other basic salt of bismuth. The coloring matters are carmine for pink or flesh tint; burnt umber, burnt sienna, bole, carmine and yellow ochre for a Rachel or brunnette tint.]

Stillman's Freckle Cream (ammoniated mercury, 20%).

Thompson's Wrinkle Lotion (alum, glycerin, water).

Tiz—Apparently approx.: alum, 60; acid tannic, 10; acid salicylic, 5; talcum, 5; starch, 20%).

Cough "Cures," Consumption "Cures"; etc.

Allen's Lung Balsam (opium, lobelia, blood root; etc.).

Dr. Seth Arnold's Cough Killer (morphin).

Ayer's Cherry Pectoral (approximately: morphin acetate, wines of antimony and ipecac; etc.—P.M.&S.J.) ("Non-alcoholic revised formula," printed on label.)

Barker's Cough Remedy (pot. iodid, methyl. salicylate, creosote).

Black's Pulmonic Syrup (water—alcohol, sol., ichthyol, glcerin, sugar. Alcohol 15.2%—1916.)

Bosanko's Cough and Lung Syrup [formerly Cure] (chloroform, alcohol, morphin, ammonia, syrup of tar, honey—No. Dak. Bull., 1911.)

Boschee's German Syrup ("opium or morphin").

Brompton Consumption and Cough Specific (approx. liq. ext. ipecac, tr. opium, treacle, water.)

Brown's Bronchial Troches (conium, cubebs, acacia, licorice, sugar).

Bull's Cough Syrup ("morphin sulphate, gr. ¼ in one ounce." Another report: codein about ½ gr. to the ounce.). (Ammon. chloride, alcohol 5%—1914.)

Cherry Balsam (a "consumption cure" labeled "harmless." Analysis showed opium, alcohol, bitter almond oil).

Child's Cough Mixture (syr. squill, wine of ipecac, tr. camph co.)

Coe's Cough Balsam [Lloyd's Specific] (opium, ammon. chlorid, ipecac; salicyl. and benzoic acids; etc.)

Crosby's Balsamic Cough Elixir. (An analysis showed chloroform, sulphuric acid, acetic acid, etc.)

DeWitt's One Minute Cough Cure (salicylic acid, chloroform).

Dr. Drake's German Croup Remedy (opium).

Duket Consumption Cure ("A glycerine solution of guaiacol carb., ac. salicyl., sod. bicarb., pot. carb., and small am't nitric acid—A.M.A., 1914).

Gowan's Pneumonia Cure (camphor, opium, carbolic acid, turpentine, quinin, stearin, lard).

Hoff's Consumption Cure (morphin, potassium, arsenic).

"Adjunct Cough Mixture Used in Conjunction with Prof. Hoff's Cure for Consumption" (codein, chloroform, alcohol).

Jackson's Cough Syrup (morphin).

Jayne's Expectorant ("opium 1 1-5 gr., alcohol 15% in each oz.," 1908); or ("opium, digitalis, camphor, ipecac, squill, tartar emetic," etc.)

Jones' Grip and Cold Tablets (acetanilid 2.44 grs. per tablet, or 50%.—Conn. Rept., 1908).

Keating's Cough Lozenges ("morphin, ipecac"); or ("ipecac, lactucarium, squill, ext. licorice, sugar, mucilage of tragacanth").

Kennedy's Laxative Cold Tablets (capsicum, camphor, podophyllin, cinchona —Kan. Bd. Hlth., 1913).

King's New Discovery for Consumption (morphin, chloroform, pine tar).

Kurakoff (ac. salicyl., oil sassafras, turpentine).

One Day Cough Cure (morphin, Indian hemp).

Piso's Cure for Consumption (morphin, tartar emetic, chloroform, Indian hemp, lobelia, etc.—Oleson, 1903, quoting

New Idea.) [Later: Piso's Cure. Piso's Remedy for Coughs and Colds] (Indian hemp, chloroform).

Sedatole (heroin, squill, sanguinaria, wild cherry, balm of Gilead buds—Drug. Circ., 1917).

Sabine's Indian Vegetable Cough Balsam (tar, resins, chloroform, alcohol, sugar, traces of alkaloids, flavored with aromatics—A.M.A., 1920).

Seelye's Cough and La Grippe Remedy (alcohol, chloroform, tar, sugar, syrup, plant material—A.M.A., 1919).

Shiloh's Consumption Cure (heroin ¼ gr., chloroform 2½ min.; per fluid ounce. Also glycerine, oil of tar, terpin hydrate, peppermint, ext. lobelia, ext. licorice; etc.—Analy. 1908.)

Smith Bros. S. B. Cough Drops (essentially charcoal and sugar flavored with oil of sassafras—N. H. Bd. Hlth., 1913).

St. Jame's Society Opium Cure (morphin, caffein—Mass. Bd. Hlth., 1904).

Stoke's Expectorant (paregoric).

Van Wert's Balsam for the Lungs (morphin 0.18 gr. per fl. oz., ammon. chlorid, alcohol, chloroform—1916).

Victor Lung Syrup (opium).

White Pine compounds for coughs and colds (commonly morphin, chloroform, etc. Sometimes contain as many as 15 ingredients).

Wistar's Balsam of Wild Cherry (opium, ipecac, squill, tartar emetic).

[Consumption "Cures".—Commonly one or more of: Morphin, chloroform, belladonna, hyoscyamus, peppermint, ginger, muriatic acid. Sometimes strychnin, creosote, guaiacol or similar agents; oil of wintergreen, sulphuric acid, potassium iodid, potassium bromid, capsicum, caustic soda, or, etc. Some are of very simple or practically worthless or inert substances as regards this disease, such as corn starch, bismuth, sugar, pancreatin, sugar of milk, soap, etc.—perhaps in conjunction with aromatic oils, etc. In one instance sugar was thus sold at $8 per pound. Nauseous combinations may impair the ability to digest suitable food, thus vitiating the victim's chief avenue of hope for recovery. Pretension to cure, "By means of sugar plus various incidentals," etc.; an exploitation frequently by conscienceless laymen or "by men who are as lacking in professional training as they are in moral responsibility" (A.M.A.). The attendant upon a case of suspected poisoning by a "consumption cure" must carefully determine if there be a true poisoning or an above indicated gastro-enteric disturbance only.]

Zaegel's Lung Balsam (alcohol, water, sugar, a laxative and oil of peppermint.—A.M.A., 1920).

Hair Dyes, "Tonics," etc. Various kinds of hair restoratives contain lead.

Absorbit (boric acid, magnes.carb., alum., calc. carb.—Ind. State Bd. Hlth.)

A. D. S. Hair Reviver (alcohol 26%, glycerine, quinin, pilocarpin, salicylic acid, menthol).

Allen's World's Hair [and Color] Restorer (lead, sulphur).

Ambrosial Hair Tonic (wood alcohol 48%—Drug. Circ., 1915).

Ayer's Hair Vigor (lead acetate, sulphur).

Ayer's Recamier [Balm also "Cream"] (corrosive sublim., perhaps zinc oxid).

Barbo Compound (lead acetate, sulphur, Glauber salt, calcium chlorid, salt, water—Conn., State Chemists, 1915).

Bordet's Hair Tonic (carbolic acid, tincture nux vomica).

Cactico Hair Tonic (borax, capsicum, oil of rose, alcohol, glycerin).

Canthrox (borax, baking soda, soap).

Capillaris (Mansfield) (a salve of corros, sublim., sulphur, zinc oxid, borax and petrolatum—Drug. circ., 1915).

Capitol (chloral, ac. tannic, ac. tartaric, fixed oil,—probably castor oil,—alcohol 65.9.—A. M. A., 1910).

Chevalier's Life for the Hair ("contains much lead"—Mass. Bd. Hlth., 1902).

Danderine (dil. alcohol—glycerin solution of boric acid, salicylic acid, resorcin, capsicum, perhaps cantharidin).

Eau de Quinine Hair Tonic (alcohol 72; borates, large amount—No. Dak. Rept., 1905).

Eau Sublime (similar to "Mrs. Potter's Walnut Stain" etc.)

Echo Antiseptic Hair Tonic (grain and wood alcohols).

Egyptian Hair Tonic and Dandruff Cure (large amount wood alcohol—1906).

Exelento-Quinine Pomade (petroleum, liquid paraffin, sulphur, trace of quinin, oil, wintergreen a trace).

Farr's Gray Hair Restorer (ammoniacal solution of silver equivalent to about 7 gr. silver nitrate to 3½ ounces of the preparation).

Goldman's Gray Hair Color Restorer (silver nitrate).

Green Mountain Hair Restorer (lead acetate, sulphur).

Hall's Vegetable Sicilian Hair Renewer (lead acetate, sulphur—N. H. Bd. Hlth. 1907).

Hays Hair Health (glycerin-water, sol. of lead acetate, with free sulphur—Conn. Agr. Experim. Sta., 1915).

Kathairon (tr. canthar, oil bergamot, glycerin, aq. ammon., castor oil, oil cloves, alcohol (perhaps wood).

La Creole Hair Dressing (lead acetate, sulphur, glycerin, alcohol and water—Analys. La. Chem.)

La Tosca Hair Tonic (98.5% wood alcohol).

Leslie Co.'s Hair Wash (common salt, 47; borax, 47; sod. salicyl., 6.—1915).

Magic Hair Tonic (common salt, alcohol).

Parker's Hair Balsam (lead acetate, sulphur).

Pinaud's Eau de Quinine (alcohol (by vol.) 67; solids (chiefly resin, similar to benzoin) 0.18; quin. sulph., minute trace; essential oils, very small amount.—Hiss. Thesaurus of Prop. Prep., 1899). (Alcohol (by vol.) 66; quin. or cinchona alkaloids, 0.02.—Journ. A. M. A., 1913).

Porto Rican Hair Growing and Dandruff Removing Cocoanut Oil (essentially cotton seed oil colored with caramel —La. Quart. Bull., 1916).

Mrs. Potter's Walnut Juice Hair Stain [later—"Hair Tint"] (active principle of the dye a phenolic compound—conformed to tests for paraphenylene diamin—a poisonous and dangerous chemical).

Rexal Hair Tonic (boric acid, wood alcohol—Ind. Bd. Hlth. Rept., 1913).

Seven Sutherland Sister's Hair Grower (borax, quinin, alcohol).

Skinner's Dandruff Mixture (chloral).

Well's Hair Balsam (lead acetate, sulphur, glycerine).

Westphaul's Auxiliator (borax, wood alcohol (by vol.) 10.96, alcohol total, 54.8; solids largely glycerin 3.56.—N. H. Bull. Hlth., 1907). (Conn. Rept., 1914, similar.)

Wyeth's Sage and Sulphur Hair Remedy (lead acetate—La. analys.)

Headache Preparations, etc.—Headache powders commonly contain: acetanilid or antipyrin, or phenacetin, or aspirin or some other analgesic, perhaps cocain; and such frequently is associated with caffein or camphor monobromate, and bicarbonate of soda, or sodium salicylate.

"In fact "headache cures" and "anti-pain" "remedies" in general depend for their results on "one or another of the coal-tar drugs, acentanilid, acetphenetidin (or phenacetin), antipyrin, etc., which depress the heart." They "injure the blood and produce a habit."

Samuel Hopkins Adams, in the Collier crusade, advised the public regarding the "drug-store-vended 'headache cures' and 'anti-pain' remedies," containing acetanilid, as follows: "Take no nostrum of this class without a doctor's prescription, unless you are sure it contains no acetanilid Make the druggist tell you. He is responsible. A suit for damages has recently been won against a New York drug store for illness, consequent upon the sale of a 'guaranteed harmless' headache tablet containing three grains of acetanilid."

Aceton (acetanilid, caffein, sod. bicarb.)

A. D. S. Headache Wafers (acetanilid 4 gr., caffein).

Ammonol (acetanilid 50 parts; sodium bicarbonate 25; ammonium carbonate 25.) [Analy. 1905.]

Anticephalgine (sodium brom., sodium salicyl., acetanilid, antipyrin, caffein, alcohol 19%).

Antikamnia (acetanilid, 68 parts; citric acid, 5; caffein, 5; sodium bicarbonate, 20—Analy. 1905). (Later—phenacetin 3.39 gr. per tablet in place of the acetanilid.)

Arnold's Headache Wafers (acetanilid, 3.15 grs. per wafer).

Blue Bell Headache Tablets (acetanilid, 2 grs.; camph. monobrom., 1.5 grs.; caffein cit., 0.5 gr., per tablet—No. Dak. Rept., 1912).

Blue Cross Headache Powders (acetanilid, 3.36 grs. per powder).

Bradbury's Capi-Cura (acetanilid, caffein, salol, quinin, sod. bicarb., camphor—1911).

Bromo Caffein (potassium bromid, sod. carb., citrates and tartrates—No. Dak. Rept., 1906).

Bromo-Lithia (acetanilid, 12 grs. per oz.; sod. phos., lith. bitart., sod. brom., caffein cit., sodium bicarb, and fruit acid, claimed—Conn. Rept., 1908).

Bromo Pepsin (acetanilid).

Bromo Seltzer (potassium bromid 10.53 parts, acetanilid 4.58 parts, caffein 1.20 parts—in 100 parts: in 1 teaspoonful about 7 gr. pot. brom., 3 gr. acetanilid and 4/5 gr. caffein.

Bromo Soda (caffein, sod. brom., sod. carb., tartrates and citrates—No. Dak. Rept., 1906).

Budd's Headache Wafer's (acetphenetidin 5 grs. per wafer; camphor, monobrom., and carbonates—Conn. Rept., 1908).

Burwell's Instantaneous Headache Cachets (acetanilid—1911).

Chandler's Headache Buttons (acetanilid 57.07%; caffein 4.40% sod. carb.; starch—1911).

Comfort's Headache Powders (acetanilid 3 grs to each powder—Ky. Bull., 1912).

Eames Tonic Headache Wafers (acetanilid).

Garfield Headache Powders (acetanilid, 3.4 grs. per powder —Wyom. Rep't., 1910).

Hick's Capudine Cure (antipyrin and caffein.—19 grains; and salicylates equivalent to about 14 grains of salicylic acid, to each fluid ounce of the preparation; alcohol 8%—A. M. A.) [Exploiters "claimed": "Hick's Capudine is not a 'dope'"; "does not contain . . . poisonous drugs," etc.]

Hoffman's Harmless Headache Powders (acetanilid, 5.02 grs., cocoa. 4.02 grs., sod. bicarb. 1.01 grs. per powder).

Howe's Headache Tablets (acetanilid, 2 grs. per tablet—1910).

Japanese Rapid Headache Powders (acetanilid, caffein, sod. bicarb.—Kan. Bd. Health, 1913).

Johnson's Utah Headache Salts (acetanilid 296.6 grs. per oz.—Idaho San. Insp. Rpt., 1912).

Kefaline Headache Cure (phenacetin, 195.6 grs. per oz.—Mass. Bd. Hlth. Rept., 1908).

Kephaldol Tablets (phenacetin, 50%; quinin, citric acid, salicylic acid, sodium comb.)

Kephalgine (antipyrin, roasted coffee, caffein, sodium salicylate).

Kephalose (antipyrin, caffein, 75.9; acetanilid, trace; pot. brom., 3.8; sod. carb., 3.3; sugar, 12.0.—A. M. A,, 1910).

Kilmer's Sure Headache Cure (acetanilid, caffein, sod. carb., camph. monobrom, acetanilid 4.3 grs. per tab.—1912).

King's Headache Powders (acetanilid 3.07 grs.; caffein 0.50 gr. per powder; sod. bicarb., cinnamon).

Koehler's Headache Powders (acetanilid 76 parts, caffein 22 parts—Analy. 1905).

Kohler's Antidote for Headache and Neuralgia (phenacetin, 2.2 grs. per powder, caffein 1.27 gr.?)

Krause's Headache Capsules (acetanilid, 3.27 grs., and caffein 0.10 gr. per capsule with sod. bicarb. and charcoal.—No. Dak. Spec. Bull., 1912).

Lavarre's Sure Cure for Headache (poke berries, sassafras, caffein 0.10 gr. per capsule with sod. bicarb. and charcoal.—peppermint, alcohol).

Leroy Headache Powders (acetanilid 3.6 grs. per powder—Mass. Bd. Hlth., 1908).

Midol [tablets]. Nurito [powders], (pyramidon—"a proprietary preparation derived from and having the antipyretic and anodyne properties of antipyrin"—Analy. 1912).

Migrainin (antipyrin, 90.97; caffein, 8.53; citric acid 0.51; water 0.07—A. M. A., 1909).

Mulford's Headache Salt (acetanilid 2.78%; bromides and caffein—No. Dak. Stat. Rept., 1908).

N. E. D. A. Headache Relief (acetanilid, caffein, sod. bicarb.—Kan. Bd. Hlth, 1911).

Nyal's Headache Wafers (acetanilid 3.64 grains, caffein 0.83 grain, in each wafer.

O. K. Headache Cure (acetanilid, alcohol).

Orangeine Powders (acetanilid 43 parts, caffein 10 parts, sodium bicarb. 18 parts—Analy. 1905).

Phenalgin (acetanilid 57 parts, sodium bicarbonate 29 parts, ammonium carbonate 10 parts).

Rex Headache Powders (phenacetin 5 grs. per powder—Conn. Rept., 1908).

Rexall Headache Powders (phenacetin, 5 grs. per powder—Conn. Rept., 1908).

Salacetin (acetanilid 43 parts, sodium bicarbonate 21 parts, sodium salicylate 20 parts—Analy. 1905).

"SHAC" [Stearn's Headache Cure] (stated to contain abt. 4 grains acetanilid, nearly 1 grain caffein, in each wafer—1908-1912).

Sherman's Headache Cure (acetanilid, caffein).

Stanley's Instant Headache Cure (acetanilid).

Strong's Headache Killer (acetanilid 4.5 grs. per powder, with baking soda and Rochelle salt).

Mrs. Summer's Harmless Headache Remedy (acetanilid, caffein, camphor, sodium salicylate—1910).

Sunshine Headache Powders (acetanilid 4.5 grs. per powder—N. H. Bd. Hlth, 1916).

Liniments, etc.—Liniments commonly contain: ammonia, or iodin, or camphor; etc. Some also contain one or more of the following: belladonna, aconite, opium, arnica, lobelia, soap, carbolic acid, oils of amber, cinnamon, sassafras, pennyroyal, peppermint, wintergreen, wormwood, juniper, hemlock, thyme, turpentine, cloves, cedar, spike or origanum; acetic acid, crude petroleum, kerosene, menthol, chloroform, capsicum, cantharides, mustard; and an oil as olive, linseed, goose, snake, skunk, woodchuck, fish, whale, seal or porpoise, etc.

Barker's Bone and Nerve Liniment (camphor, turpentine, oil of tar, perhaps oil of thyme—Oleson, from New Idea).

Beamer's Liniment (gasoline solution of a small quantity of camphor and capsicum).

Beaver Oil Compound (essentially gasoline, sol. of oleores. capsicum, oil sassafras; no animal oil present, at analysis—1910).

Brodie's Liniment (sulphuric acid, turpentine, olive oil).

California Liniment (ether, chloroform. oil of lobelia).

Carter's Liniment (approx. formula: gum camphor, 4 dr.; oils of turpent., origanum, cedar, wormwood, sassafras. hemlock each 4 drams; bals. fir, 1 oz.; chloroform 1 oz.; sulph. ether 1 oz.; tr. capsic., 2 oz., alcohol 64 oz.—Oleson, 1903).

Centaur Liniment (turpentine, caustic soda, essential oils, soap).

Classe's Great Penetrating Liniment (alcoholic solution of: ammonia, chloroform, opium, camphor, oils of sassafras, organum and thuja; alcohol 64%; chloroform 35.3 min. per fl. oz.)

Fluid Lightning (aconite); (another of the reputed formulas: oil of mustard, cajeput, cloves and sassafras each 2 fluid drams, ether 1 fluid ounce, laudanum 1½ fluid ounces, alcohol 20 fluid ounces).

Dr. Grove's Anodyne for Infants (essentially a sugar syrup, flavored with oil of spearmint and containing 1-7 gr. morphin sulph. to each fld. oz.—A.M.A., 1919).

Gunn's Rheumatic Liniment (oils of cedar and amber; turpentine, laudanum, camphor).

Hinkley's Bone Liniment (oils of wormwood, hemlock, thyme and turpentine with capsicum).

Jones' Liniment (essentially, gasoline solution of oleoresin capsicum, oil sassafras, methyl salicylate, volatile oil, mustard.—1916).

Liniment of Opium (Brit.) (tincture of opium and soap liniment equal parts).

"Magnetic Liniments, Rheumatic Oils of "Joy"; "Gladness," etc. (commonly contain several or many of the following: capsicum, camphor, ammonia, opium, turpentine, sassafras, contharides, ether, chloroform, oils of hemlock, rosemary, amber, origanum, peppermint, horsemint, marjoram, cedar, etc.)

Parson's Liniment (tar oil, kerosene).

Sloan's Liniment (essentially: turpentine, a light oil similar charac. as kerosene or coal oil, oil sassafras, oleores. capsicum, and appar. pine oil.—N. & Q.—Cramp, 1918.

Thomas's Electric Oil (chloroform, camphor, catechu, opium, oils of hemlock, wintergreen, origanum, sassafras and turpentine; alcohol).

Thompson's Liniment (menthol, camphor, oil turpentine, oil eucalyptus, chloroform tr. capsicum, methyl, salicyl., liqd. petrolatum).

Tobias Venetian Liniment (ammonia, camphor, capsicum, alcohol, water).

Wilson's Lightning Liniment (capsicum, ammonia, camphor, turpentine, chloroform, opium, alcohol, oils of cedar and sassafras).

Pain Preparations.

Caldwell's Anti-Pain Tablets (acetanilid 51.4; caffein, 12.3; corn starch 23.2; and camphor—1912).

Chlorodyne or Chloranodyne (an old formula: Chloroform 1 dram, morphin 5 grains, ether ½ dram, oil of peppermint 4 drops, hydrocyanic acid dilute 1 dram, tincture capsicum 1 dram, extract licorice 15 grains, molasses 10 drams. Mix. More modern formulas are: Morphin sulphate 24 grains, tincture cannabis Indica 6 drams, chloroform 6 drops, tincture capsicum 12 drops, oil peppermint 12 drops, hydrocyanic acid dilute 72 drops, alcohol 3 1-5 ounces, glycerine 3 1-5 ounces. Mix.

Or: Morphin hydrochlorate 32 grains, alcohol 3 fluid ounces, tincture Indian cannabis 1 fluid ounce, tincture capsicum ½ fluid dram, oil peppermint 12 minims, chloroform 1 fluid ounce, dilute hydrocyanic acid 2 fluid drams, glycerine enough to make 8 fluid ounces. Mix.

Dexter's Headache and Antipain Powders (acetanilid, caffein, sodium salicylate).

Fosgate's Anodyne Cordial (paregoric, ginger, rhatany, rhubarb).

Green Mountain Oil (Magic Pain Destroyer) (oils sassafras, turpentine, thuja?, camphor?, linseed oil).

Lindsey's Pain Cure (capsicum, camphor, chloral, chloroform, ether. oils of hemlock, cinnamon, sassafras, cloves, cedar, origanum, wintergreen.

Miles' Anti-Pain Pills (acetanilid 1.96 grs. and caffein 0 32 gr. per pill; sod. bicarb., starch).

Monroe's Neuralgia Tablets (sod. brom., acetanilid, morph. sulph., gelsemium—Kan. Bd. Hlth., 1910).

Pain Ease (acetanilid).

Perry Davis's Pain Killer (opium, camphor, capsicum); or (Spt. camphor, tr. capsicum, tr. guaiac, tr. myrrh, alcohol).

Pope's Cure for Neuralgia (conium, potassium iodid).

Radway's Ready Relief (ammonia, capsicum).

Schoenfeld's Pain Relief (chiefly kerosene with some oils of sassafras and mustard; cayenne pepper.—Kan. Bd. Hlth., 1912).

Vermifuges.

Brown's Male-Fern Vermifuge (Fl. ext. male fern, oil wintergreen).

Dike's Worm Syrup (santonin, cascara, sod. bicarb., oil of anise.—Conn. Rept., 1914).

Fahnestock's Vermifuge (reputed ingredients: oils of wormseed, anise and turpentine; tincture of myrrh, and castor oil).

Freeman's Vermifuge Oil (pink root, oils of wormseed and turpentine; hydrastin, castor oil, syrup of peppermint).

Hand's Worm Elixir (santonin, emodin, oil peppermint, alcohol, 10.2.—Conn. Rept., 1914).

Jayne's Tonic Vermifuge (sodium santonate, pink root, jalap, erigeron, turpentine—Oleson).

Kennedy's Worm Syrup (santonin).

Kennkle's Vegetable Worm Syrup (santonin, pink root).

Kickapoo Indian Worm Killer (0.5 gr. santonin per tablet).

Low's Worm Syrup (santonin 4.2 gr. per fl. oz.; senna?; alcohol 11%).

Notkin's Worm Syrup (santonin, senna, alcohol).

Nyal's Worm Syrup (santonin).

Pleasant Worm Syrup (santonin, cascara sagrada, sod. bicarb., alcohol).

Proctor's Vermifuge (santonin, pink root).

Rexall Worm Syrup (santonin, pink root, senna, potass. hydroxid, oil wintergreen, glycerin, water—Street).

Vermin Killers.

Battle's Vermin Killer ("23% strychnin, Prussian blue sugar, and flour).

Butler's Vermin Killer (strychnin 5%, soot and flour).

Gibson's Vermin Killer (½ grain strychnin in each package).

Simpson's Vermin Killer (arsenous acid 40%, mixed with malt and starch).

[Some vermin killers contain phosphorus or arsenic with or without ground glass.]

Miscellaneous.

"A. C. E. Mixture" (alcohol 1, chloroform 2, ether 3, parts).

Abernethy's Pills (blue pill 2 gr., co.ext. colocynth, 3 gr.)

A. D. S. Fruit Laxative (phenolphthalein, tamarind pulp, cassia fistula, fig pulp, gingerin, aromatics).

Aletris Cordial (alcohol 28%, aletris, helonias, scrophularia).

Alkalol (pot. chlor., pot. bicarb., eucalyptus, spearmint, cinnamon, vanilla, acid salicylic, acid boric).

Allan's Anti Fat (pot. iod., salicyl. acid. glycerin, fl. ext. bladderwrack).

Allan's Restorative Tonic (alcohol 33%).

Alophen Pills (aloin, strychnin, ext. belladon. leaves, powd. ipecac, phenolphthalein).

Alpha-Lax (magnes. sulph., pot. chlorid, acid tartar., sod. bicarb.)

Alypin ("local anesthetic;" "closely related to stovaine;" "claimed to be equal to cocain." Used externally in 10% sol.; hypoderm. 1 to 4% sol. Has poisoned.)

Ambition Pills (iron, aloes).

Anadol (acetanilid, 79; caffein; sod. bicarb., 20—A. M. A., 1910).

Analgine Tablets (acetanilid).
oxydendron, arboreum, abbucus canadensis, urginea scilla.df

Anasarcin (Winchester, Tenn.) (Tablets: claimed to contain active principles of oxydendron arboreum, sambucus canadensis, urginea scilla. Elixir: claimed to contain active principles of oxydendron, sambucus, hepatica, and potassium nitrate—A. M. A., 1907).

Anedemin (Chattanooga, Tenn.) (claimed to contain isolated active principles of strophanthus, apocynum, squill and sambucus chemically combined.—Similar to "Anasarcin"—1907).

Anticalculina Ebrey (essentially, alcohol 28.8% by vol., colchicin, ammonium salts, vegetable extractives, water—A.M.A., 1920).

Antidipso (pot. brom.)

Anti-Grippine (acetanilid 1.77 gr. per tablet.—Ind. Bd. Hlth., 1915).

Anti-Growl (acetanilid).

Antineurasthin ("A mixture of egg yolk, milk sugar and gluten, with small amounts of starch, dextrin and aromatics.")

Antiphlogistine (a clay poultice practically identical with Cataplasma Kaolini, U. S. P. The official poultice contains kaolin, boric acid, thymol, methyl salicylate, oil peppermint, glycerin).

Anti-Plug—Appar., bruised gentian and licorice roots, bound together into plugs with tobacco leaves by means of pressure—Oleson, 1903, quoting from "Western Drug.")

Aphlegmatol (appears, upon analysis, to be merely a concentrated solution of glucose—1920).

Arthur's Sexual Tablets (iron, calc. carb., podophyllin-like drug, aloes, buchu, pepper, capsicum, cinnamon, small amount pepsin—1917).

Ascatco (opium, arsenic, pot. cinnamate).

Athlophoros (pot. acetate, sod. salicyl.)

Ayer's Ague Remedy ("non-alcoholic revised formula" contains quinin, ginger, cinnamon, cloves, peppermint, orange peel, glycerine, water).

Ayer's Pills (aloes, ginger, jalap, colocynth, podophyllin, gamboge, oils of peppermint and spearmint).

Aspirin [Acetylsalicylic Acid]. Acts like salicylic acid and salicylates. Often used in doses of 5 to 15 grs. repeated once in 3 hrs. until ears ring, producing its full effects.

Atwood's Jaundice Bitters (22% alcohol).

Ayer's Recamier Moth and Freckle Lotion (corrosive sublimate).

Ayer's Vita Nuova (cocain, alcohol—Oleson quoting Drug. Circ.)

Ayer's Sarsaparilla ("Fl. exts. sarsaparilla, stillingia, yellow dock, May apple; potassium iodid 3.4 grains per fluid ounce; iron iodid, glycerine or sugar"). New formula on label.

Baby's Soothing Syrup (morphin 1/20 gr. per fl. oz., alcohol, 10%.—N. H. Bd. Hlth., 1916).

Bacterol (cresols 50%, potash soap).

Ballard's Wonderful Golden Oil (oil peppermint, 2.9; methyl salicyl 0.95, linseed oil 96.15, veratrin—1916).

Balm of Figs Compound (ichthyol, alum, boric acid).

Balsam of Life (Cook's) (camphor, borax, water, etc.—Drug. Circ., 1916).

Bateman's Pectoral Drops (tinctures of opium, opium benzoated, and Canada castor with ground cochineal), (or, like "Pectoral Tincture, N. F.")

Battley's Solution (50% stronger than laudanum).

Beecham's Pills (aloes, ginger, soap.—Anal., 1914).

Bell's Pa-pay-ans [Bell-Ans] (Essentially ginger, charcoal, sodium bicarb., saccharin, oil wintergreen).

Bengue's Balsam [Baume Analgesique Bengué] (menthol 18, methyl salicyl, 20, lanolin 54, lard 8.)

Betul-Ol (menthol, 2%; 2% of chloral in methyl salicylate).

Big G Injection (similar to berberin hydrochl. 15 gr.; zinc acetate, 15 grs.; glycerin 14 dr.; water q. s., 8 oz.—Drug Circ.) (Essentially a watery sol. of boric acid and berberin —A.M.A., 1919).

Bile Beans (aloin, cardamon, perhaps colocynth).

Black Cloud Healing Mixture (corros. sublim, 1oz.; oil of tar, 1 gal.; turpentine, 1.5 oz.; phenol 5 oz.; wood alcohol, 1 gal.—No. Dak. Rept., 1911).

Black Drop (Brit.) (4 times as strong as laudanum).

Blair's Pills (Gout and Rheumatism) . (Colchicum, alum).

Bloodine Blood and Kidney Tablets (methylene blue, hexamethylenamin and salicylates.—1916).

Blue Bell Bright Sunshine Tablets (arsenic, damiana, zinc phosphide, nux vomica, cantharides, glycerine, corn starch).

Boracetine similar to Antiseptic Solution (N.F.) with "a dash of formaldehyde."

Bowden's Indian Balm (lard, tallow, cocoanut oil, rape oil, oil eucalyptus, ess. oil camphor, ess. oil lemon, lanolin, balsam Peru,terebene, sol. ammon.)

Boys' Friend (solution—zinc sulph., boric acid, hydrastin, lysol—as injection. Pills.—iron oxide, powd. cubebs.—Ind. Bd. Hlth., 1913).

Brandreth's Pills ("Ext. colocynth, aloes, soap, oils of peppermint and cinnamon, gum arabic and alcohol.")

"Break-Up-The-Grip" Tablets (acetanilid).

Bromidia (one should bear in mind that the essential drug is not the bromid. Given formula: Chloral hydrate 15 grains, potassium bromid 15 grains, extract cannabis Indica ⅛ grain, extract hyoscyamus ⅛ grain).

Brown's Blood Treatment (pot. iod., a mercury comp'd.—1916).

Brown's Teething Syrup (morphin, oil anise—No. Dak. Rept., 1906).

Brush's Remedy for Seasickness (sod. brom., 14.94 grs.; citric acid 2.71 grs. in 100 c.c.—A. M. A., 1909.)

Bull's Blood Syrup (red iodide of mercury, potassium iodid, poke root).

Burnett's Disinfecting Fluid (corrosive. zinc chloride, 220 grs. to oz., ac. hydrchl., etc.)

Cacapon Healing Water ("it consisted in part of a filthy decomposed and putrid animal and vegetable substance."—A.M.A., 1919).

Calder's Saponaceous Dentine (calc. carb., 56; soap 44.—Oleson from "New Idea." 1903).

Caldwell's Rheumatism Cure (sod. salicyl., ammonia, bromids, chlorids, phosphates, sodium, alcohol 14.5.—1912.

Camphenol (camphor cresol, phenol—A. M. A., 1910).

Campho-Phenique (phenol, 20; camphor, 38; liquid petrolatum, 38.—A. M. A., 1907.

Carbolineum ("contains 85% of phenol"—Witthaus).

Cardui, Wine of (McElree's) (alcohol 20.36; valerian; appar.; blessed thistle; nitrates; etc.) (Later: benzoates, 10% alcohol).

Carney's Common Sense Cure for Opium Habit ("a series of solutions containing 2, 3, 8 and 9 grs. of morphine per fl. oz."—Mass. Bd. Htlh. Rept., 1907.)

Carter's Little Liver Pills (approximately: "Podophyllin 1½ gr., aloes (socotrine) 3½ gr., mucilage of acacia, sufficient; mix, divide into 12 pills; coat with sugar.")

Castoria (reported as approximately: "Senna 4 dr., Rochelle salt 1 oz., Manna 1 oz., fennel '(bruised)' 1½ dr., sugar 8 oz., boiling water 8 fl. oz., oil of wintergreen, sufficient"); or (senna, 2 oz.; pumpkin seed, 6 dr.; Rochelle salt, 4 dr.; Levant wormseed, 3 dr.; sod. bicarb., 2 dr.; anise seed, 1 dr.; oil wintergreen, ½ dr.; oil peppermint ⅛ dr.; sugar 8 oz.; water to make 1 pint—Western Druggist).

Cascarets ("Said to contain casc. sag. and senna, combined with antiseptics and aromatics, each tablet representing 10 min. of fl. ex. cascara sagrada."—Oleson, 1903.

Cassell's Blood Cleansing Tablets (pot. iodid, phenolphthalein, etc.)

Celerina (cocain—Anal., 1908). (Claimed formula :"Alcohol, 42; kola, 40 grs. per fl. oz.; viburnum, 40 grs. per fl. oz.; celery, 48 grs. per fl. oz.; cyprepedium, 20 grs. per fl. oz.; xanthoxylum, 16 grs. per fl. oz.; aromatics."—A. M. A., 1915).

Chameleon Oil (approx.—ess. oils of mustard, spearmint, pimento, cassia, camphor; oil turpentine, alcohol, strong sol. ammonia).

Children's Comfort (morphin, alcohol).

Chloralose (chloral, glucose).

Churchill's Prescription for Nervous Debility (pot. brom., lith. carb., calisaya, golden seal, pareira brava).

Clarke's World-Famed Blood Mixture (pot. iod., alcohol, chloroform, ammonia).

Coal-Tar Creosote (contains cresols; much more poisonous than that from beechwood or other wood-tar; beechwood creosote contains 60 to 90% of guaiacol, but without phenol or cresols).

Coca-Bola (cocain).

Coke Extract [a soft drink] (cocain).

Cold-in-the-Head Tablets (aconite, camphor, creosote).

Collyrium (Wyeth) (antipyrin, borax, boric acid).

Colwell's Egyptian Oil (opium).

Cooper's Quick Relief (capsium, oil sassafras, alcohol 31.5%).

Cram's Fluid Lightning (oils of mustard, cajeput, cloves, sassafras, ether, tr. opium, alcohol—Oleson, 1903).

Crayons, Colored Crayons, French Chalk [some crayons mistaken for candies by children, and are likely to contain chromium. The cheaper varieties of artists' crayons and colors commonly contain arsenic. Crayons frequently contain white lead and coated. Some are Dutch pink mixed with Prussian blue].

Creolin (Pearson) ("consists chiefly of cresols with saponified resins"—Witthaus).

Cresols, The [3 kinds: ortho, meta and para] (they "accompany benzophenol in coal-tar, from which a mixture of the three is obtained as a yellowish or brownish liquid, which is used as a coarse disinfectant—Witthaus). (Marketed under different significant names, etc.)

Crossman's Specific Mixture (opium).

Cures for Drunkenness, Drug Habits, etc., under various names, commonly found to contain an opiate, or cocain, or bromides or both; etc. (e. g., Habitina, advertised as "A positive cure" of the "morphin and other drug habits" and formerly called "Morphina-Cura"—½ oz. bottle of the liquid, upon test, found to contain 8 grains morphin sulphate and 4 grains heroin hydrochlorid—"enough morphin to kill 7 or 8 people.") Such preparations frequently found to contain either belladonna, hyoscyamus, hyoscin, camphor, cannabis Indica, caffein, strychnin, tartar emetic, pilocarpin, carbolic acid, spartein, etc., either alone or combined with one or more of the others.

Cuticura Ointment ("Carbolic acid (2%), [or salicylic acid], petroleum jelly, oil of bergamot").

Cuticura Resolvent ("Aloes, rhubarb, potassium iodid, whisky"), (or, potassium iodid, alcohol).

Dalby's Carminative (2½ minims of laudanum to the ounce).

Danderine (salicyl. acid, borax, capsicum, glycerin).

Dent's Toothache Gum (creosote, carbolic acid, cotton, beeswax.—Idaho Rept., 1912).

DeWitt's Little Early Risers (croton oil).

Diarrhoea Mixture [(Children) (Guy Hospital)] (prepared chalk, co. chalk powder, tinct. catechu, chloroform, water—Amer. Druggist).

Dobells Sol. (Comp'd Sol. of Sodium Borate, N. F.)

Dodson's Remedy (accetanilid, caffein, ac. salicyl., pot. brom.)

Drake's Plantation Bitters (St. Croix rum. Was 33.2% alcohol).

Dr. Don's Kola [a flavoring extract for soft drinks] (cocain, caffein, phosphoric acid).

Dr. Elder's Celebrated Tobacco Specific ["Cures smoking, chewing, cigarette and Snuff Dipping Habits in 3 to 5 days"] (analysis showed contained cocaine, strychnin, cinchona, etc.)

Dr. Fahrney's Teething Syrup (morphin, alcohol, chloroform).

Dr. James' Soothing Syrup (heroin).

Dr. Moffett's Teethina; Teething Powders (opium, calomel, etc.)

Dr. Seelye's Compound Extract of Sarsaparilla (pot. iod., small amount plant extractives, aromatics, coloring matter, sugar, alcohol, water—A.M.A., 1919).

Elliman's Royal Embrocation (oil turpentine, oil thyme, oil amber, caustic soda, soap).

Embalming Fluids (one or more of the following: zinc chlorid, arsenic, formaldehyde, carbolic acid, camphor or tannin; etc. (Sometimes contain thymol, potassium bichromate, carbonate, nitrate or sulphate).

Ergot Apiol Compound [capsules Ergot Apiol Compound. Apiol 5 min., Oil Savin ½ min.; Ergotin 1 gr., Aloin ⅛ gr.' (Analysis: 50% cotton seed oil and resins from apiol and oil of savin.—A. M. A., Aug., 1920.)

Every Woman's Flesh Reducer (Epsom salt, camphor, alum, citric acid, sod. carb.)

Extract of Opium (19-21% morphin—U. S., Brit.)

Femenina (alcohol, sugar, water, perhaps some valerian —A.M.A., 1919).

Firwein (bromin, iodin, phosphorus).

Fitzkure (ammon. brom., pot. brom., pot. iodid, pot. citrat.)

Foramint (not a def. chem. compound. Use may be unsafe.—A. M. A.)

Ford's Laudanum (A tr. of opium with cinnamon and cloves).

Fruit-a-Tives [(essentially, extracts of nux vomica (strych.) and cinchona bark (quinin)—A.M.A., 1920)].

Fruit Preservative for Canning (boric acid 94.3%, benzoic acid 0.4%, sodium chloride 5.3%—Ewe in Amer. Druggist).

Get Slim (tartaric acid, citric acid).

Get Well Tablets (acetanilid, codein, belladonna).

Gloria Tonic (pot. iodid, guaiac, resin, licorice).

Glyco Heroin (Smith) (heroin, hyoscyamus, ammon. hypophos., tolu, white pine bark, glycerin, alcohol.—1914).

Glyco-Thymoline (borax, sod. salicyl., sod. benzoate.—1914).

Garfield Tea (chiefly senna and crushed couch-grass—Oleson, from New Idea, 1903). (Later—1917-18—also valva, mallow flowers, and fruits, and mint stems; perhaps manna. Sassafras, pot. carb., alcohol). See Mist. Sassf.—N. F.

Go To Sleep (sulphonal).

Green's Dropsy Remedy (boluses: apparently powdered squill; tablets; apparently dried ferrous sulphate.)

Green Mountain Herb Tea (esentially, senna, fennel, elder flowers, anise, triticum, sassafras, Amer. saffron, coriander, licorice root, butternut bark, buckthorn, Epsom salt—A.M.A., 1920.

Greene's Nervura (alcohol 18%; celery, ginger, etc.)

Gregory's Antiseptic Oil (kerosene oil, oil of cloves, cassia and sassafras, a trace of camphor and pepper resins—A.M.A., 1920).

Gude's Pepto-Mangan ("water 81.17%; alcohol (by weight) 13.25; organic matter 17.98; ash 0.85; iron oxid 0.41; manganese oxid 0.16; total nitrogen 0.16; ammonia nitrogen 0.12."—Conn. Rept., 1908.)

Haarlem Oil (oils of amber, turpentine, flaxseed, Barbadoes, tar; balsam of sulphur).

Hale's Honey of Horehound and Tar (Mfrs. claimed before June ,1906, alcohol 13%; opium 5/13 gr. per fl. oz. June, since Mar., 1910, alcohol 13%; no opiates.—Mfrs. Letters to 1906, to Mar., 1910, alcohol 13%; codein ¼ gr. per fl. oz.; Street, Dec. 3, 1914).

Hamburg Drops (aloes, saffron, tr. myrrh.—Oleson, 1903).

Hamlin's Wizard Oil (Spt. camph., 1 fl. oz.; spt. ammon.; chloroform, oil sassafras, oil turpentine, each 4 fl. dr., oil cloves, 2 fl. dr., alcohol, q. s., to make 5 fl. oz.—Hiss, 1912).

Happy Life Pills (aloin, capsicum, starch).

Harper's Brane-Fude (Cuforhedake) (caffein, antipyrin, acetanilid, bromides potassium and sodium, alcohol 24.2).

Harrison's Opium Cure (opium 5%, alcohol 19.72%.—Idaho Rept., 1912.)

Health Grains (quartz sand, 87.5; rock candy and syrup, 12.5.—A. M. A., 1909.)

Hepatola (powder: seidlitz powder; liquid: olive oil colored with a coal tar dye and slightly flavored with peppermint—A.M.A., 1920).

Hill's Laxative Quinine Tablets (acetanilid, 1.9 grs.; quinin, caffein, tannic acid and a veg. cathartic.—1915).

Hodnett's Gem Soothing Syrup (opium 4.8 grs. per fl. oz., alcohol, 4%.—1910).

Holloway's Pills (aloes, ginger, soap).

Home Doctor Backache and Kidney Pills (magnesia 8; powd. capsicum, 20; pot. nitrat, 26; oil juniper 3; soap, 1; sugar, 17; starch, gum and water, q. s. to make 100.—More Sec. Rem., Br. Med. Assn., 1912).

Hood's Compound Extract of Sarsaparilla (4 4/10 grains potassium iodid per fluid ounce; 16½ to 18% of alcohol).

Hood's Vegetable Pills (aloin, ginger, capsicum, colocynth, soap and probably jalap.—M. S. R., Br. Med. Assn., 1912).

Hooper's Anodyne, The Infant's Friend (morphin).

Hooper's (Dr. John) Female Pills (iron, senna canella, jalap, oil pennyroyal 2 drops in 100 pills.—M. S. R., Br. Med. Assn., 1912).

Hop Bitters (reported 12%-20% alcohol).

Hostetter's Bitters (Diluted alcohol 4 gals.; Peruvian Bark, gentian, columbo and calamus roots, orange peel, rhubarb, cinnamon, cloves and sugar totalling about 26 ozs.; also reported 25 to 44.3% alcohol).

Human Ease (lard 95.5%; baking soda 1.6%; Glauber salt, 0.2%; saltpeter 1.9%; oil sassafras.—A. M. A., 1916).

Hunjadi Janos Water (sodium sulphate, magnes. sulph., calc. chlorid, calc. sulphate, sodium carb., sodium chlorid, potass. sulphate; varies in content of potassium sodium and calcium salts.—From Drug. Circ.)

Hunter's Red Drops (corrosive sublimate, muriatic acid).

Hydras (hydrastin, cramp bark, helonias, scutellaria and dogwood; alcohol 24%; aromatics.—A. M. A., 1916).

Hyomei (Booth's) (oil eucalptus 80; alcohol 10; liquid paraffin, 10, creosote, small amt., wood tar, possibly 0.2.—Br. Med. Assn., 1912).

Hymosa (acid salicyl., sodium salicyl., pot. iodid.—A. M. A., 1910).

Injection Brou (similar formula said to contain: lead acetate, zinc sulphate, tincture catechu, cocain. Another formula gives opium instead of cocain).

Invigoroids (nux vomica, zinc, phosphid, iron carb., asafetida.—Br. Med. Assn., 1912).

Iodex ("5% iodin, and free idoin claimed" by mfrs. "Iodin content only about 3%." "Free iodin not present in appreciable amounts." ('Use Ung: Iodi. U. S. P. for free iodin oint.'—A. M. A., 1920).

Jad Salts (principally sod. phosph., pot. and sod. bicarbonates, citric and tartaric acids, and very small amount hexamethylenamin.—Wiley, 1914).

Japanese Drops (chloroform, 68 min.; oil cloves, 68 min; oil peppermint, 68 min.; camphor, 62 grs.; carbolic acid, 208 min. per fl. oz.—No. Dak. Rept., 1908).

Jarabe de Ambrozoin (terpin hydrate, menthol, benzoic acid, ammon. chlorid, sodium bromide, glycerine, alcohol, sugar, water—A.M.A., 1920).

Jaynes Alterative (similar formula said to contain: tartar emetic, digitalis, camphor, opium, lobelia), (or epsom salt, table salt, molasses, glycerin, sarsap. ext., 25% alcohol).

Kampfmueller's Rheumatic Remedy (pot. iodid, plant extractives, alcohol, water—A.M.A., 1920).

Katarno [The new name for the old Peruna.] "The alcoholic preparation with practically negligible medicament."—Br. Med. Assn.

Kickapoo Indian Oil (camphor; oils of turpentine, peppermint, wintergreen; tincture capsicum; alcohol).

Kilmer's Swamp Root (alcohol 10%; sugar, salicylic acid, water, etc.).

Kilo-Tobac (Bottle: aq. sol. silver nit., 1%. Box: pepper, nux vom., a silicate, piperin, strychnin, brucin.—No. Dak. Spec. Bull., 1914).

Kline's Great Nerve Restorer (bromides of ammonium and potassium).

Koenig's Nerve Tonic (pot. brom., 30 sod. brom., 30; ammon. brom., 10; ext. viburn, prunif., 10; co. tr. valer., 130; glycerin, 30; water, 430 parts).

Koko (borax, glycerin, formaldehyd, alcohol).

Kopp's Baby's Friend (analysis showed ⅓ grs. morphin in 1 fluid ounce of the preparation—Analys., 1905. "Alcohol 8.5%. morph. sulph. ⅛ gr. to oz."—1916.

Kornol (collodion with ac. salicyl in alcohol and ether.—Dr. Wiley).

Kutnow's Improved Effervescent Powder (claims to be composed of ingredients of celebrated Carlsbad spring—tartaric acid not present in natural Carlsbad water. A German analysis of Kutnow's: Tartaric acid, 43.60; carbon dioxid, 14.27; sulphuric anhydrid, 4.27; sodium oxid, 20.39; potassium oxid, 8.89; chlorin, 1.82.—A. M. A., 1907).

Laird's Rheumatism Formula (pot. iod., 120 grs.; sod. salicyl., 60 grs.; Rochelle salt, 1 oz.; wine colch. seed, 1 oz.; tinct. guaiac, 1 oz.; water 4 oz.—A. M. A., 1915).

Lambert's Wine of Coca (cocain).

Lane's Brain Relief (acetanilid, alcohol).

Laudanum (Brit.) (Strength 1 gr. in 14 min.)

Laxaphen (phenolphthalein, acid salicyl.)

Laxative Bromo Quinine (phenacetin 2.19 grs. per tablet.—Ind. Bd. Hlth, 1915).

Laxative Quinine Tablets (contain acetanilid).

Laxatol (phenolphthalein).

Lightning Hot Drops (chloroform (48 drops to the oz.), ether, capsicum, alcohol 60%—Report Journ., A. M. A., 1916-18).

Lindley's Golden Remedy (ammon. potass., and sodium bromids).

Liquid Extract of Opium (Brit.) (22 gr. ext. opium in an ounce).

Listerine (similar to Liquor Antisepticus, U. S. P.—boric acid, benzoic acid, thymol, eucalyptol, oil peppermint, oil wintergreen, oil thyme, alcohol, purif. talc., water).

Louisenbad Reduction Salt (Queen of Beauty) (2/3 sod. sulph., 1/3 common salt.—Drug. Circ., 1915).

Luxor (zinc oxid, boric acid).

Lysol "Marketed in 1889; (obtained by boiling a mixture of heavy tar oils with fat or, resin and an alkali. It therefore contains the alkali compds. of the cresols and of their superior homologues along with soaps."—Witthaus.)

Magic Eye Salve (zinc oxid, benzoic acid, petrolatum—A.M.A., 1918).

Magic Toothache Gum (chloral, phenol, oil of cloves, wax, cotton, etc.—No. Dak. Rept., 1908).

Make-Man Tablets (strychnin, arsenic, aloes, potassium sulphate, iron).

Manola (alcohol (by vol) 18.00; sugar, glycerine, traces calcium, magnes., iron, sodium, arsenic.—A. M. A., 1913.)

McCorrison's Famous Diamond Lotion (corros. sublimate).

McGraw's Liquid Herbs of Youth (essentially: epsom salt, senna, red pepper, quassia, alcohol, water, wintergreen flavor—A.M.A., 1920).

Methylene or Bichloride of Methylene (anesthetic of chloroform, and methylic alcohol 20%).

Mendenhall's Number 40 for the Blood (pot. iodid, ammon. acet., cathartic resins, licorice, glycerin, sugar, alcohol, water—A.M.A., 1920).

Mexican Oil (opium).

Mile's Restorative Nervine (bromids, benzoic acid).

Modoc Oil (approx., benzine, 75 c.c.; methyl salicyl, 4.5 c.c.; oil sassafras, 6 c.c.; chloroform 0.2 c.c.; oil turpentine q. s. to make 100 c.c.—No. Dak. Rept., 1912).

Mother's Friend (opium); another, of Atlanta (soap, oil).

Muller's Famous Prescription (potass iodid, colchicin—1917).

Munyon's Kidney Cure [pills] (found to contain nothing but ordinary white sugar—A. M. A., Journ., 1907).

Munyon's Special Liquid Blood Cure (corros. sublim., 0.42; pot. iodid, 50.78).

Musterole (oil of mustard 1.67; menthol; appar. camphor. A fatty base such as lard 89.17.—Conn. Rept., 1915-16).—("Apparently contains wool fat as fatty base.")

Nepenthe (of about same strength as laudanum, and said to contain glucose and sherry wine).

Neurosine (Mfr. claims for each fl. ounce: bromides of potassium, sodium, ammonium each 40 grs.; zinc bromid, 1 gr.; ext. lupulin, 32 gr.; fl. ext. cascara sag., 40 min.; ext. henbane, 0.075 gr.; ext. bellad., 0.075 gr.; ext. cannab. Ind., 0.600 gr.; oil bitter almonds, 0.060 gr.; aromatic elixirs—A. M. A., 1915).

Newbro's Herpicide (wood alcohol, 44% to 52%; salicyl. acid, borax.—No. Dak. Bull., 1916).

Newell Rheumatic Tablets (common salt, 20; sal ammoniac, 80)

New Skin (flexible collodion with amyl. acetate.—Wiley, 1914).

No-To-Bac (possibly licorice, gentian, ammon. chlorid and ginger made into mass with glycerin, tragacanth and syrup. —Oleson, 1903).

Novocaine ("Local anesthetic similar in action to cocaine but said to be less toxic than other cocaine substitutes." For infiltration anesthesia, 4 grains in 3 1/5 ounces normal salt sol., with 5 drops of 1:1,000, epinephrine sol. added secures sustained anesthetic effect.) (See Procain.)

Nurito (phenolphthalein, 6; pyramidon, 60; milk sugar, 34. —A. M. A., 1912).

Nuxated Iron (iron 1/100 gr., nux vomica alkaloids 1/1000 gr. in one tablet; aromatics).

Nyal's Coca Wine (contained cocain.—Mass. Bd. Hlth., 1907).

Nyal's Compound Extract of Damiana (contained cocain—1910).

Nyal's Compound Laxative Fig Syrup (epsom salt, veget. extractives).

Nyal's Soothing Syrup (sod. bromid 16 grs. per fl. oz.; lupulin, ext. fennel?).

Oil of Life (Joy of the World) (raw linseed oil, with oils of sassafras, hemlock, origanum, cedar, and gum camphor in solution.—No. Dak. Rept., 1910).

Osborne's Mixture for Epilepsy (pot. brom., 166 grs. in 1 oz.—Brit. Med. Assn.)

Paine's Celery Compound (alcohol 19% to 21% and various seeds, roots, barks, leaves; chamomile flowers, pot. nitrate, glycerine, sugar).

Palpebrine (morph. sulph., zinc sulph., corros. sublim., boric acid, salicylic acid).

Pantopon (mixture of hydrochlorids of various opium alkaloids).

Pape's Cold Compound (acetanilid, 13.1; phenolphthalein, 15.1).

Paregoric (Paregoric Elixir—Brit.); 1 gr. in about ½ oz.)

Petit's Eye Salve (morphin).

Peacock's Bromides (mfr. states: bromids of potassium, sodium, ammonium, calcium, lithium 15 grs. per fl. drm.; alcohol 10%).

Pebeco Tooth Paste (pot. chlorate, calc. carb., soap, methyl salicyl., menthol.—Wiley).

Peeble's Brain Restorative for Epilepsy ("Solution of ammonium, sodium and potassium bromids, combined with an alcoholic preparation of valerian, flavored with oil of bitter almond."—1911).

Perfection Cold Tablets (camphor, salicyl. acid, aloes, quinin.—Kan. Bd. Hlth., 1910).

Perry's Magic Remedy for Rheumatism (water, alcohol, solution of oil wintergreen and pot. iodid).

Perspiro (Ac. salicyl., ac. boric.—A. M. A. 1908).

Perspi-No. (boric acid, 20; ac. salicyl, 22; calc. carb., 10; talc., 42).

ky). In 1906 owner notified to put some medicine in the preparation, or it could be sold only where liquor license was carried. A laxative was added; but that appeared to have materially injured its sale. Therefore later announced: "Old Peruna (now called Ka-tar-no) and sold as an alcoholic beverage." [Alcoholic strengths: whiskey, bottled in bond, 50%; champagne 9 to 12%; claret 5 to 12%; beer 2½ to 5, etc. %.]

Pheno-Bromate (acetanilid, 50; pot. bromid, 50).

Pike's Liver, Kidney and Stomach Remedy (an acid astringent solution; essentially: Epsom salt, ferric chloride, arsenous acid, hydrochloric acid, coloring matter, water.—A. M. A., July, 1920).

Pink Pills (iron sulphate, sodium or potassium, carbonate, licorice).

Pierce's Favorite Prescription (opium, digitalis, savin).

Pierce's Golden Medical Discovery (opium, podophyllin, guaiac) or, (mfr. claims: golden seal root, queen's root, stone root, black cherry bark, blood root, mandrake root, glycerin, borax, water).

Pierce's Smart Weed (opium).

Pinkham's (Lydia) Vegetable Compound (Said to closely resemble infusion or decoction of "life everlasting" plant; 15 to 20% alcohol). (Alcohol 16.32% by vol.), glycerin, lovage or angelica and possibly aloes or aloin and tansy: etc.—Conn. Rept., 1916).

Plant Juice (alcohol (by vol.) 20%; glucose, aloes, licorice and possibly small amounts cascara or senna; etc.—A. M. A., 1916.

Plantation Sarsaparilla (pot. iod., alcohol—A.M.A., 1918).

Platt's Chlorides (approximately: chlorides of aluminum, calcium, hydrogen, lead, mercury, sodium, zinc and aluminum sulphate).

Pluto Concentrated Spring Water (sulphates of calcium, magnesium, sodium; common salt, magnes. carb.)

Poslam (zinc oxid, sulphur, acid salicylic, oil of tar, menthol, corn starch, and probably petrolatum; perhaps lanolin and soft paraffin).

Procain (Novocaine) commonly used in 1% sol., etc., as local anesthetic).

Prunoids (phenolphthalein, cascara sagrada, slight quan. prunes, de-emetinized ipecac).

Pulmonol (potassium guaiacol sulphonate, 5.7; sod. benzoat, 2.1; strych. sulph., 0.008).

Queen Bee Injection .cocain, zinc, magnesium, sulphates, traces potassium and sodium, glycerin.—La. Bd. Hlth. Rept., 1914-15).

Radway's Ready Relief (watery alcoholic solution of oleoresin, capsicum, camphor and ammonia.

Radway's Renovating Resolvent (potassium iodid).

Rat Exterminator (barium chloride, calcium sulphate, corn meal, or similar starchy meal—Ewe, in Amer. Druggist.)

Ree's Cholera Mixture (opium, chloroform, cloves).

Reave's Embrocation (olive oil, aqua ammonia, oil origanum, Goulard's lead extract).

Rexall Cold Tablets (phenacetin, 1 gr. per tablet.—Ind. B. H., 1915).

Rexall Dyspepsia Tablets (mfr. claims pepsin, rhubarb, magnesia, bismuth, oil of cassia.—Street).

Rexall Gastric Tablets (mfr. claims aloin, gentian and capsicum.—Street).

Rheumacide (antipyrin, salol, citric acid, aspirin).

Richie Drug Habit Cure (morphin, sulph., salicyl. acid, pepsin).

Rival Herb Tablets (essentially: aloes, podophyllum resins. capsicum, buchu and plant extractives; coated with calcium carbonate and sugar although labeled "chocolate coated."—A. M. A., Aug., 1920.)

Roche's Embrocation (oils of cloves, lemon, amber, olives); (also: "asafetida, alkanet, olive oil; oils of caraway, turpentine, wintergreen, pine needles, bergamot.")

Sabine's Indian Vegetable Tea (similar to Green Mountain Herb Tea).

Sage's Catarrh Remedy (golden seal, borax, salt).

St. Jacob's Oil (chloral 1 oz., chloroform 1 oz., ether 1 oz., tr. opium ½oz., camphor 1 oz., oils of origanum and sassafras ½ oz. each, alcohol ½ gal.), or, (ether, turpentine, carbolic acid, capsicum, aconite, origanum, alcohol).

Sal Hepatica (sodium sulphate 26.27 parts, sodium phosphate 29.80 parts, sodium bicarbonate 18 parts, lithium phosphate 4/100 part, salt 13.05 parts, citric and tarartic acids sufficient to make 100 parts.) Said to be intended to imitate Carlsbad salt.

Sal-Sano (essentially :table salt, sod. phos., baking soda, Glauber's salt—A.M.A., 1920).

Sanatogen ("Casein makes up about 95% of the preparation." Casein is commonly known as the curd, in milk, or as cottage cheese.)

Sanford's Woman's Friend (pot. permang., alum, zinc sulph.; lead acetate?).

Sanitas Disinfecting Fluid (terpenes, hydrogen dioxid present; chlorides, trace.—No. Dak. Bull., 1913).

Sanitol (An analysis showed salol, menthol, alcohol, formaldehyd; perhaps common plantain present).

Saprol ("contains 40% of cresols"—Witthaus).

Schenck's Pulmonic Syrup (wormwood, catnip, tansy, hoarhound, hops, hyssop, chamomile, comfrey, elecampane, senega—wintergreen).

Scotch Oats Essence (morphine 2 gr. to bottle; 35% alcohol).

Scotch Paregoric (ammoniated tincture of opium), (90 min. equivalent to 1 gr. opium).

Sealeaf Emulson (cod liver oil, malt extract, chocolate, alcohol, aromatics, water—A.M.A., 1920).

Seawright Water ("the water consisted in part of a filthy and decomposed vegetable substance."—A.M.A., 1919).

Seelye's Laxa-Tena (essentially laxative plant material, sugar, alcohol, water—A.M.A., 1919).

Seelye's Wasa-Tusa (ammonia, chloroform, camphor, capsicum, aromatics, alcohol, water—A.M.A., 1919).

Seigel's (Mother) Curative Syrup (aloes, capsicum, dil. acid hydrochlor, molasses, water.—Br. Med. Assn., 1909).

Seven Seals, or Golden Wonder (ether 4, chloroform 6, camphor 4, tr. capsicum 35, oil peppermint 32, alcohol 50-90%).

Silex (sand 98.5%, baking soda, cayenne pepper.—Kan. Bd. Hlth. Bull., 1910).

Simpson's Rat Paste (40% arsenous acid).

Skin Success Ointment (red mercuric oxid.—Mass. Bd. Hlth. Rept., 1898).

Steedman's Soothing Powders (calomel 27; sugar 22; corn starch 50.5.—Brit. Med. Assn., 1909).

Stuart's Specific Drops (a turpentine solution of camphor, alcohol and mercuric iodid).

Sukro-Serum ("not a 'serum' in the ordinary sense, but apparently it is a solution of ordinary sugar (sucrose)"—A.M.A., 1920).

Swift's Syphilitic (or "Sure") Specific (S. S. S.) (cupric sulphate, roots of the fringe tree, prickly ash, white sumac, red sumac and sarsaparilla); alcohol 15%.

Syrup Cocillana Compound (heroin hydrochl., etc.), or, (mfs. claim per fl. oz.; Tr. euphorb. pilulif., 120 min.; syr. wild lettuce, 120 min., tr. cocillana, 40 min., syr. squill co., 24 min., cascarin, 8 grs.; heroin hydrochl., 8/24 gr.; menthol, 8/100 gr.—See Pk. Davis & Co.).

Syrup of Figs (Purging action due to senna and not to figs. Found to be 25% an elixir of senna and 6% of alcohol. In U. S. had to add to the title of "Syrup of Figs," also the words "and Elixir of Senna," because of the American Food and Drugs Act.)

Syrup of Poppies (British); (originally a preparation from poppy capsules; now usually a variable mixture of laudanum and syrup).

Tanlac (formerly "Cooper's New Discovery") (A wine to which has been added gentian, buckthorn (or rhubarb or cascara), a berberin bearing drug, glycyrrhizic acid and glycerin, flavored with wild cherry, alcohol (by vol.) 15.70." "Berberin emodin, licorice, gentian and glycerine present; tartaric acid small amount.—A. M. A., 1915.)

Taylor's Horehound Balsam (codeia sulph., methyl salicyl., chloroform, camphor).

Teething Powders (usually contain calomel 1 grain, Dover's powder 2 grains, milk sugar 3 grains).

Thieleman's Cholera Mixture (opium, chloroform, ether, ipecac, peppermint, alcohol).

Thompson's Eye Water (copper and zinc sulphates, spirit camphor, tincture saffron).

Toilet Bowl Cleaner (sodium bisulphate and sodium chloride in molec. propors. Added to water in bowl liberates Hcl. from Nacl. and cleanses bowl.—Ewe in Amer. Druggist). Sulphuric acid does it well.—A. H. B.

Tongaline (essentially sod. salicyl. mixture).

Tousley's Sneezeless Snuff (morphin, menthol, borax, quinin.—Kan. H. B.)

Trafton's Balm of Life (potassium iodid, opium).

Tucker's Fever Drops (alcohol 29%; camphor, glycerin, tinct. opium 1.7 min. per fl. oz.; .1 min. ipecac).

Tutt's Pills (calomel, aloes, starch, sugar).

Unguentine (zinc oxid, aluminum acetate, phenol, aromatic oils, petrolatum).

Unguentum Mirabile (red mercuric oxide, camphor, boric acid, etheral oil of beech, petrolatum, spermaceti, olive oil—Rept. de Pharm., in Amer. Druggist).

Van Buskirk's Sozodont (soap, red sanders, oil wintergreen, water, alcohol).

Vapo Cresolene (appears to be "essentially cresols and corresponds in every respect to cresol of the U. S. P."—A.M.A. 1908).

Var-ne-sis (alcoholic sol. [15-18%] containing less than 1% of vegetable drug extracts, chiefly derived from emodin-yielding (laxative) drugs and capsicum.—Conn, Rpt., etc., 1915-18.)

Varnesis "Extra Laxative" (Mag. Sulph. 15.07 reducing sugars, licorice and rhubarb or cascar.—N. H. Bd. Hlth., 1916.)

Verandah Chem. Co.—Aspirin Tablets ["Acetyl. Salicylic Acid, Aspirin"] ["Aspirin 5 gr."] (Containing no aspirin; contained ac. salicylic, corn starch, talc, milk sugar, calc. carb., and a small amount of sod. citrat.—A.M.A., 1919).

Veronal Tablets (should be dissolved before being administered). Fatal effects from as little as 15 grains of the drug.

Vin Mariani (cocain.—Mass. Bd. Hlth, 1907). (A mixture of Bordeaux wine and an alcoholic extract of decocainized coca leaves.—Conn. Rept., 1915).

Vinol (alcohol ,by vol.), 18.69; oxids of iron, sodium and potassium; phosphoric acid; dextrose; glycerin., etc.—Conn. Rept., 1914.)

Walker's Vinegar Bitters (golden seal 1 oz., cape aloes ½ oz., water 16 oz.; also reported 61% alcohol).

Warner's Safe Cure [or Remedy] (salt petre, liverwort, wintergreen, bugle weed, alcohol, glycerine, etc.).

Waterman Institute Morphine Cure (alcohol, morph. sulph., 13.7 gr. to 16 grs. per fl. ounce.—1912).

Watkin's Anodyne (heroin).

White's Elixir (tartar emetic, camphor, opium).

Wilson's Compound Sarsaparilla (5.1% alcohol; molasses). [Journal Amer. Med. Ass'n, (May, 1912): "It is extremely improbable that there is any therapeutic value in sarsaparilla."]

Wilson's Original Wahoo Bitters (Epsom salt, salicyl. acid, sassafras, gentian, prickly ash—1917).

Wilson's Solution Anti Flu (oil of euclaptus, methyl salicyl. and a small amount of thymol or oil of thyme.—A. M. A., Aug., 1920.)

Mrs. Winslow's Soothing Syrup (morphin, essence of anise, syrup of balsam of tolu, etc.) "No longer contains opiates. Now apparently a mixture of carminatives and laxatives." "Winslow's Soothing Syrup" ("For years contained morphin" and still found in preparations in U. S. market in 1912). (Finally, in Great Britain, potassium bromid substituted for the opiate, but alcohol was still present.)

Woodbury's Standard Rheumatic Salts (aspirin).

Wooley's Cure for Alcoholism (morphin).

Wright's Instant Relief (opium).

Zaegel's Essence (alcohol, water, sugar, a laxative and a saponin—A.A.M., 1920).

Zemo (alcohol (by vol.) 28.35%, methyl salicyl, thymol, borax, tannic acid, glycerin, menthol, phenol-like bodies present.—A. M. A. Journ., 1915).

KEY—SUPPLEMENT

Absorbit (Boric acid, 18 parts; magnes carb., 40 parts; alum, 10 parts; calcium carb., 22 parts.—Ind. State Bd Hlth.)

"Andrews' Wine of Life Root or Female Regulator" (federal chem. analys. = 14% alcohol, sugar, methyl salicyl., tannin); and the "Annex Powders" ("composed of almost equal parts of common salt and baking soda with a small amount of washing soda").

Apothesine Local anesthetic similar to procaine (which is similar in action to cocaine but less and feebly toxic and having unsustained action, which is remedied by injecting epinephrine simultaneously), but slower in action. Used with 1 to 100,000 epinephrine usually; on cornea or by injection or anesthesia, in 1 to 2%. Subcutaneously, for complete anesthesia, in 4% sol. Is practically non-toxic and not injured by boiling solutions.

Bad-Em-Salz (salt, Glauber salt, baking soda, tartaric acid.—Anal. federal chemists.)

Black's Pulmonic Syrup (water-alcohol sol. of ichthyol, glycerin and sugar.—Govt. analysis, 1916.)

Bovinine (a blood preparation containing 11% alcohol and over 6% glycerin.—A. M. A., 1917-1918).

Calocide (salt, borax, alum, tannin.—State Chemists, Conn.)

Calocide (common salt, about 22.44%; borax, about 37.58%; alum, about 39.35%; tannin, a small amount.

Chichester's English Pennyroyal Pills (now called Chichester's Diamond Brand Pills) (appar. aloes and iron sulphate.—Journ. A. M. A.; 1911).

Collargol (colloidal silver); (used as germicide and antiseptic in gonorrhoeal ophthalmia, etc.

Constituents: Common principal constituents of certain varieties of patent medicines are:

"Headache cures: Acetanilid, antipyrin, phenacetin, or some similar drug.

"Female weakness cures"; also various "tonics": Alcohol; perhaps an alkaloid of nux vomica, or some vegetable bitter; frequently, also colored and flavored.

"Epilepsy cures": Bromids.

"Diuretics: Often with some disease-aggravating kidney irritant, for the self treatment of kidney disease; also for diabetes—with endeavor to foster the common fallacy that diabetes is a kidney disease instead of a nutritional affection.

D. D. D. (chloral hydrate, 2 gr.; [= chloral rash?] alcohol 28%, to oz.—U. S.). (ac. salicyl 0.75; ac. carbol 1.18; ol. gaulth, 1.00; glycerin 9.28; alcohol 65.10; water 22.69.—Chemists, Brit. Med. Assn.)

Dial "Ciba." Action similar to barbital (veronal), as sedative and hypnotic. Dose not to exceed 7 grs. in 24 hrs.

Disinfectant Krelos-Mulford (a sol. of cresols and rosin soap).

Doan's Kidney Pills (oil of juniper, pot. nitrate, hemlock pitch, powd. fenugreek, etc.—Anal. chemists, Brit. Med. Assn.)

Doan's Kidney Pills ("oil of juniper, potassium nitrate; powdered fenugreek seeds and wheat and maize (corn) starches."—From analysis by British Medical Ass'n.)

Dr. Carter's K. & B. Tea (senna, liverwort, wintergreen leaves, juniper berries, with buchu. and boneset leaves, and possibly uva ursi.—Anal., N. & Q.—Cramp).

Dr. D. Kennedy's Favorite Remedy (alcohol 18%, sugar 50%, pot. acetate, methyl salicy, aloes, licorice, oil sassafras. —Analys., federal chemists).

Dr. Grove's Anodyne for Infants (Essentially a sugar syrup, flavored with oil of spearmint and containing 1-7 gr. morphin sulph. to each fld. oz.—A. M. A., 1919).

Dr. Gunn's Pain Expeller (alcohol 50-60% and 1⅕ to 1¾ grs. opium to oz.; camphor and capsicum.—N. Dakato Agric. Experm. Sta., 1911).

Dr. Gun's Pain Expeller (opium.—Col. State Bd. Hlth., 1909). (Alcohol, 50-60%, 1⅕ to 1¾ grs. opium to the ounce; camphor and capsicum present.—N. Dakota Agric. Exp'mt. Station, 1911; N. & Q.—Cramp).

Dr. Pierce's Anuric Tablets (acetate, carbonate, chlorid, iodid, phosphate, salicylate, ammonia, calcium, iron, potassium, sodium, emodin, aloin, quinin, hexamethylenamin and sugar—apparently also Canadian hemp, queen of the meadow; etc.—Chem, Lab. Journal, A. M. A.—1917.)

"Alcohol for Kidney Diseases: Of course is contra-indicated in inflammatory diseases of the kidney. Potassium is a kidney irritant and it would tend to aggravate any inflammation that might exist."

"The popular idea that urinary sediments and pain in the lower part of the back mean kidney diseases, while false, is assiduously cultivated by certain patent medicine makers, to frighten and sell."

Duffy's Malt Whiskey ("Alcohol, syrup for smoothness and coloring matter"; or, "whiskey of a very poor quality"; or, "whiskey, with a little cane sugar added to it."—Anal. rept., 1912).

E-Lep-Tine (sod. and pot. bromides 16%, alcohol 6%, ammon. valerate.—Indiana State Bd. Hlth.)

Enteronol ("essentially: alum, camphor, ginger, red pepper, tannic acid and phenolphthalein.")

Exelento-Quinine Pomade (petrolatum—"vaseline") 91.84%; liquid paraffin with trace of oil of gaultheria 6.18%; sulphur 1.29%—other subs., including trace of quinin, 0.098%.—La. state chemists—circ. 1918).

Father John's Medicine (essentially a cod liver oil emulsion.—Conn. State Chems., 1911).

Fruitatives (appar. similar char. and action as aloes strych., and belladoin—laxative pills.—Mod. from Journ. A. M. A., 1917).

Garfield Tea (essent. senna leaf and triticum, valva—mallow—flowers and fruits and mint stems—perhaps manna. —Anal., A. M. A. Journ.—N. & Q.—Cramp, 1921).

Gem Balsam (85% cottonseed oil, 15% oil of turpentine.—Anal. Bureau of Chem., U. S.)

Get Slim (essentially: sugar colored pink; tartaric acid colored pink; baking soda, a white powder.—Lab. Jour. A. M. A.) (1914).

Giles' Germicide (analys. indic., oily mixt. of chiefly linseed oil, ether and camphor.—A. M. A., 1918; N. & Q.—Cramp.)

Giles' Germicide (linseed oil, ether, camphor.—Journ. A. M. A., 1918).

Green Mountain Oil or Magic Pain Destroyer ("essentially linseed oil 95%, with oil of sassafras, oil of thuja and oil of turpentine, with possibly small amounts of camphor."—N. & Q.—Cramp; Med. Journ., A. M. A., 1915.)

Greenhalgh Diphtheria Remedy (essent. mixt. of "sulphur, borax, trace of starch, plant tissue carrying berberin, iron, aluminum and potassium, as sulphates and nitrates, with charcoal and traces of manganese dioxiod indicated."—Analys., N. & Q.—Cramp.)

Gregory's Antiseptic Oil (approx. kerosene oil 89%, with small amounts of oil of cloves, cassia and sassafras and a trace of camphor and pepper resins.—Anal., Bureau Chem.—N. & Q.—Cramp.—Journ., A. M. A., 1920).

"Gonorrhea and Gleet 3-Day Cure" (analys. indic. sol. zinc sulph. and sulphocarbolate, boric acid, opium and hydrastin. —N. & Q.—Cramp.)

Homenta (essent. menthol, thymol, ammonia, sugar 61% +, alcohol 4.6%, water.—Journ. A. M. A., 1918—N. & Q.—Cramp).

H. G. C. (aq. sol. borax and berberin. sulph.—Anal. U. S. Gov't Chems.; N. & Q.—Cramp),

Humphrey's Pile Ointment Witch Hazel Oil (Compound). ("Essent. a camphor ointment on a lard base."—Jour. A. M. A.—N. & Q. Cramp).

Ice Mint (Borax, oil of peppermint or menthol.—Lab. Analys.—Report N. Y. Tribune in Ad-visor Dept., 1917).

Jacob's Liver Salt (sod. phosph., sodium sulphate, common salt with mixture washing soda and citric acid). Analys.—U. S. Gov't reports).

Kathairon (said to consist of: "Castor oil, 1 fl. oz.; Tr. Cantharides, 1 fl. dram.; Oil of Bergamot, ⅓ dram.; stronger ammonia water, 1 drop, alcohol enough to make 3 fl. ozs.; Oleson, 1903 quoting New Idea"); or, (oil of cloves and glycerin, with some methyl alcohol present in the mixture.—From Ind. Bd. of Health Report, 1913.)

Kay's Linseed Compound (chloroform, 1.07; alcohol, 4.30; sugar, 48; mucilage of decoction of linseed, 19; oil of anise, present; tolu and squill, small amounts; ipecacuanha alkaloids, 0.007; morphin alkaloid, 0.021.—Secr. Rem., 1909, 12.)

Keller's Flaxseedine (alcohol 4.6 per cent., gum and plant extracts, appar. syrup, flaxseed, molasses and senna.—Anal. Bur. Chem., 1914-15.)

Keene's One Night Cold Cure ("sugar-coated tablets colored with ferric oxid. Pill mass contains cinchonin sulphate 0.21 gr.; acetanilid, 0.32 gr.; calcium carbonate, 0.25; gr.; starch, 0.34 gr.; extractive and excipient, 0.87 gr. Manufacturer claims cascara, bromid, quinin, ipecac, camphor and bryonia. No bromid found, no quinin (except merest traces), no camphor, not more than a trace of cascara (if any), no ipecacuanha alkaloids; extract of bryonia may be present.—Secr. Rem., 1909, 6.")

Kennedy's Laxative Honey and Tar ("alcohol, sugar, syrup, pine, tar, codein, croton oil, salicylic acid, chloroform, oil of peppermint and oil of sassafras."—Minn. D. and F. Dept. Rept., 1907, 614, and No. Dak. Expt., Stat. Rept., 1906, pt. 2, 157).

Kennedy's Medical Discovery ("alcohol (by volume), 44.0; solids, 2.5; mandrake or similar drug, present.—No. Dak. Expt. Stat. Rept., 1907, p.. 2, 148.")

Kennedy's Pinus Canadensis, Light. ("Later called 'Abican.' Claimed to be a non-alcoholic extract of Pinus Canadensis, to each fl. oz. of which is added 24 grs. each of potash alum and zinc sulphate, and 0.48 gr. of thymol. Analysis showed no tannin.—Jour. A. M. A., Feb. 13, 1915, 608.")

Kennedy's Pinus Canadensis, Dark. ("Later called 'Darpin.' Claimed to be a non-alcoholic extract of Pinus Canadensis, to each fl. oz. of which is added 0.48 gr. of thymol. Analysis showed tannin."—Jour. A. M. A., 1915.)

Kora-Konia (Mennen). ("Contains zinc stearate, 44%; talc., 48%; magnesium carbonate, 5%; boric acid, 3%."—Jour. A. M. A., 1916.)

Kosine (approx., antipyrin 11 gr., ammon. brom. 100 gr., sod. brom. 31 gr.—Conn. S. A. Sta., 1914).

Kroy Wen Ointment (Mfrs. formula claims carbolic acid (phenol), witch hazel, arnica, menthol, thymol, zinc ozid, oil of hemlock, oil of cajaput, oil of cade, sulphur, boric acid and base.—Conn. Rept., 1914, 302.")

Kulux Compound (zinc oxid, 7%; bism. subcarb., 5%; glycerin, 10%; water, 78%.—Ind. State Bd. Hlth.)

Lafayette Mixture ("Formula: copaiba, 125 c.c.; Spt. nitrous ether, 125 c.c.; comp. tinct. lavender, 125 c.c.; sol. potassium hydroxid, 32 c.c.; syrup, 300 c.c.; acacia mucilage quan. suf. to make 1,000 c.c."—Jour. A. M. A., 1917.)

La Sage Complexion Treatment [tablets and capsules to be used as wash] (essentially a weak sol. of soda, and borax; phenolphthalein to color.—From Lab. Analys.; Jour. A. M. A.—1914).

Laxative Quinine Tablets (acetanilid 1.9 gr. per tablet; also quinin, caffein, tannic acid and veget. cath. drug.—From Analys. U. S. Bureau of Chemistry.

Leonard Ear Oil (liquid petrolatum, ammonium oleate (soft soap) oleic acid, camphor, eucalyptol, alcohol, water.—Dept. of Hlth., City of N. Y., 1917-18).

Leonard Ear Oil ("to all intenes and purposes liquid petrolatum with camphor, eucalyptol, etc., emulsified by aid of a soft soap produced from ammonia and oleic acid."—From an analys., Dept. Hlth., City of N. Y.)

Lepso (bromids equiv to about 6.8 pot. brom in each fl. oz. = abt. 51 gr. pot. brom. to a dose.—A. M. A. Lab.— Journ., 1915).

Lucile Kimball home obesity treatment (Pink Pills = prin. red pepper, menthol and bitters). (Brown Tablets = aloin type of cathartic pill). (Powder = soap, Epsom salt, and washing soda.—Dr. Wiley, Report, 1914).

MacDonald's Atlas Compound Famous Specific No. 18 [pills] ["essentially: sodium sulphate (Glauber's salt), sodium bicarbonate (baking soda), a laxative plant drug) (apparently aloes), ginger, small amount of phosphate, a trace of alkaloid and talc." "The pills coated with starch, calcium carb. and sugar, and coating colored with fluorescin."—Anal. federal chemists, 1916-17].

Marmola (approx. dried thyroid gland, phenolphthalein, sod. chlorid., powd. bladder-wrack, "extractive," and oil of peppermint a trace.—From analyses—Br. Med. Journ.; Journ. A. M. A., 1909).

Mayrs Stomach Remedy [essent. olive oil: Rochelle salt (or Epsom salt)]. ["Gall stones = principally a mixture of fatty acids and soap" (sodium salt of fatty acids)—"produced by the action of the alkaline intestinal fluids on the large amount of oil taken."—Journ. A. M. A.; 1911].

Medinal (barbital sodium).

Mendenhall's No. 40 for the Blood ("essentially: pot. iod., cathartic resins, ammon, acet., licorice, glycerin, alcohol, sugar and water."—N. & Q.—Cramp.)

Mentholatum (essent. petrolatum and 5% boric acid, 10% menthol, and camphor,.—Jour. A. M.A., 1918; N. & Q.—Cramp.)

Mentholatum ("essentially: petrolatum with about 5% boric acid and 10% menthol and camphor."—N. & Q.—Cramp.)

Mother Hart's Baby Syrup ("opium 3 gr. to oz., and alcohol 10%.")

Mrs. Edward's Infant Syrup (morphin and alcohol.—Jour. A. M. A.—N. & Q.—Cramp).

Mu-col (common salt and borax equal parts, and aromatics. —Journ. A. M. A., 1914).

Nature's Remedy Tablets ("essentially: aloes or aloin, cascara and belladonna with probably podophyllin."—A. H. Clark in Journ. A. M. A.; etc.).

Odor-O-No (practically a 33% of aluminum chlorid (hydrous).

Phenoco ("A mixture of coal tar cresote and higher phenol homologues—phenols containing two or more methyl groups—in soap solution"). (Is said to contain coal tar creosote, 20%; phenol homologues, 50%; and soap, 30%.) Is 16 to 16 times stronger than phenol but claimed to be non-caustic, non-irritant and only half as toxic as phenol. Used in 1 to 5% or more solutions. Is incompatible with strong alkalies and acids.

Phenol Sodique (phenol.—1918; N. & Q.—Cramp).

Resinol (an antiseptic prep., appar. quite similar to Resorcin Co. Oint (N.F.), but minus bismuth and perhaps wool-fat).

Resorbin (a mixture of soap, wax, oil, gelatin and sheepswool oil.)

Salvitae (federal analys. about 1920 = essentially citric and tartaric acids with sulphates, carbonates or bicarbonates and phosphates of magnesium, sodium, potassium, and lithium, with a trace of hexamethylenamine.—N. & Q.—Cramp).

Sedatole (Heroin, tolu, blood root, squill, wild cherry, balm of Gilead buds.—Drug. Cir., 1917).

Sevetol ("An emulsion of fats—14.1% of oil").

Samaritan Nervine (abt. 19% pot. brom.; and indications of atropin—1917).

Swamp Root (essentially: alcohol, about 9%; sugar, water and flavoring matter with a slight laxative principle").

Terraline (liquid petrolatum).

Three Chlorides (Henry). "Mfr. claims (per fl. drm.) mercuric bichlorid, 1/72 gr.; arsenic chlorid, 1/40 gr.; iron protochlorid 2/25 gr.; in a cordial of calisaya alkaloids."—Jour. A. M. A., 1915.)

Tiz (appar. similar tab. = "alum 60%, tannic acid 10%, salicylic acid 5%, talcum 5%, starch, 20%."—Journ. A. M. A., 1911).

Tri-Iodides (Henry). ("Formula 1910: Colchicin 1/20 gr.; phytolaccin, 1/10 gr.; solanin, ⅓ gr.; sodium salicylate, 10 grs.; iodic acid (= to iodin), 7/32 gr.; in 2 fl. drm. of aromatic cordial.") ("Formula 1914;: In 2 fl. drm.= colchicin, 1/200 gr.; phytolaccin, 1.2 grs; mydriatic alkaloids, 1/500 gr., sodium salicylate, 3.5 grs.; iodic acid (= iodin, 7/125 gr)

Tutt's Pills (aloes, calomel, starch, sugar.—Federal anal. —1915).

Veril (areca nut, vermifuge).

Vick's Vap-O-Rub (yellow vaseline ¾+ part; camphor, menthol, oils of thyme, eucalyptus and turpentine = ¼ part. —La. chems.; also Jour. A. M. A., 1918).

Williams' Pink Pills ["for pale people"] (Sugar, iron sulph., pot. carb., starch; a veg. subs., strych., talc.—Anal. fed. Chem.—1914).

Williams' Pink Pills for Pale People (appar.: ferrous sulph.; potass. carb.; trace of strych.; starch; talc; sugar).

Wilson's Patent Ring Worm Cure [or "Dethblo."] (Ferrous sulphate; glacial acetic acid).

KEY TO TREATMENT.

(A digest arranged from the preceding pages of Part II.)

POISON.	TREATMENT. Chemical and Mechanical.	Physiological.
ACETANILID. ANILIN. ANTIPYRINE. EXALGIN. PHENACETIN.	Evacuate the stomach.	Recumbent position. Artificial respiration. Caffeine Citrate. Digitalis. Strychnine. Oxygen. Heat.
ACID— ACETIC. *—Mineral Acids—* HYDROCHLORIC. PHOSPHORIC. NITRIC. SULPHURIC.	Magnesia. Albumin. Lime-Water. Soap, Demulcents. Avoid emetics and stomach pump if acid concentrated.	Stimulants. Opium. External heat.
ACID— CARBOLIC. CREOSOTE. GUAIACOL. ETC. (PHENOLS.)	Alcohol. Evacuate stomach. Sodium or Magnesium Sulphate. Lime-Water or Syrup of Lime. Soap. Albumin. Demulcents. (Avoid Oil and Glycerine)	Atropine. Opium. Stimulants. External heat. Artificial respiration.
ACID— CARBONIC.		Fresh air. Friction, and heat to extremities. Artificial respiration.
ACID— HYDROCYANIC (also the CYANIDES).	A mixture of Ferrous and Ferric Sulphates with Sodium or Potassium Hydroxide or Carbonate or Magnesia. Evacuate stomach if time. Pot. Permanganate or Hydrogen Peroxide. Demulcents if required.	Cold douches. Ammonia or Chloride of Lime inhalations. Artificial respiration. Stimulants. Artificial heat.
ACID— OXALIC.	Lime in any form. Magnesia. Demulcents.	Stimulants. Opium. External heat.
ACONITE.	Tannic Acid (10-30 grs.). or Animal Charcoal (1 tablespoonful). Syphon out stomach. (Avoid emetics.)	Horizontal position. Artificial respiration. Digitalis. Artificial heat. Stimulants.

N. B.—By STIMULANTS is meant not only Alcohol, but also the various cardiac and respiratory stimulants, such as Ammonia, Digitalis, Caffeine, Strychnine, Nitroglycerine, Atropine, etc.

POISON.	TREATMENT. Chemical and Mechanical.	Physiological.
ALCOHOL, ETHYL.	Evacuate stomach.	Cold to head; heat to extremities. Ammonia inhalations. Ammonium Chloride. Atropine. Digitalis. Electricity. Artificial respiration.
ALCOHOL, METHYL.	Evacuate stomach.	Pilocarpine Hydrochlorate. Treat as for Ethyl Alcohol.
ALKALIES— AMMONIA, CAUSTIC POTASH, CAUSTIC SODA, LIME, etc.	Dilute Acids, especially Vegetable Acids, as Citric or Tartaric, Lemon, Orange juice, Vinegar. Milk, Oil.	Stimulants. Artificial heat. Opium. For Ammonia: Aconite, Digitalis, cold air.
ALKALOIDS.	Tannic Acid. Charcoal. Iodine. Albumin. Evacuate stomach.	Maintain circulation and respiration.
ANESTHETICS— CHLOROFORM, ETHER, NITROUS OXIDE.	When Swallowed: Evacuate stomach if possible, and give water containing Sodium Carb. or Bicarb. Also demulcents if necessary.	Remove cause. Place head low. Artificial respiration. Fresh air, Oxygen. Atropine. Stimulants Artificial heat.
ANTIMONY and its COMPOUNDS.	If necessary evacuate stomach. Tannic Acid. Demulcents.	Stimulants. Opium. Artificial heat.
ARSENIC— ARSENOUS ACID. FOWLER'S SOLUTION, PARIS GREEN. "ROUGH ON RATS," etc.	Evacuate stomach. The Hydrated Oxide of Iron with Magnesia; or, the Hydrated Sesquioxide of Iron; or Dialyzed Iron. Demulcents. Castor Oil.	Stimulants. Opium if necessary. Artificial heat. Spt. Nitrous Ether
BARIUM and its COMPOUNDS.	Evacuate stomach. Magnesium or Sodium Sulphate. Demulcents.	Stimulants. Opium if necessary. Artificial heat.
BELLADONNA. HYOSCYAMUS. STRAMONIUM.	Tannic Acid. Evacuate stomach.	Opium. Pilocarpine Nitrate. Muscarine. Artificial respiration. Alternate hot and cold douches. External heat. Stimulants.
CANNABIS— AMERICAN or INDIAN HEMP.	Tannic Acid. Evacuate stomach.	Stimulants. External heat.

POISON.	TREATMENT. Chemical and Mechanical.	TREATMENT. Physiological.
CHLORAL. CHLORALAMID.	Evacuate stomach. (Is well to siphon out stomach with tea or coffee.) Liquor Potassæ (℥ ½–2 in water ℥ viii.)	Artificial respiration. Cold to head. Ammonia and Oxygen inhalations. External heat. Picrotoxin. Strychnine. Atropine. Stimulants
COCAINE.	If swallowed: Give Tannic Acid and evacuate stomach if possible.	Horizontal position. Fresh air. Amyl Nitrite. Morphine. Atropine. Art. resp. Stimulants. Oxygen. Heat. Electricity. Ether, etc.
CONIUM.	Tannic Acid. Evacuate stomach. Demulcents.	Place head low. Stimulants. Artificial heat. Artificial respiration if necessary.
COPPER and its COMPOUNDS.	Potassium Ferrocyanide. Albumin or milk. Evacuate stomach. Demulcents. Magnesia.	Artificial heat. Stimulants. Opium.
CROTON OIL.	Evacuate stomach. Demulcents.	Artificial heat. Opium. Stimulants.
DIGITALIS.	Tannic Acid. Evacuate stomach. Magnesium Sulphate.	Horizontal position. Aconite. Saponin. Alcoholic stimulants. Artificial respiration. Heat.
FOOD, POISONOUS.	Tannic Acid. Evacuate stomach. Castor Oil. Antiseptics if required.	Stimulants. Atropine for poisoning by Muscarine. Artificial heat.
GASEOUS POISONS.		Fresh air. Oxygen. Artificial respiration. Rest. Stimulants.
GELSEMIUM.	Tannic Acid. Evacuate stomach. Castor Oil.	Morphine. Atropine. Stimulants. Artificial respiration. Hot and cold douches alternated. Artificial heat. Electricity.
IODINE and its COMPOUNDS.	Starch or flour with water. Evacuate stomach. Demulcents.	Stimulants. Artificial heat. Morphine.
LEAD and its COMPOUNDS.	Magnesium or Sodium Sulphate. Alum. Evacuate stomach. Demulcents.	Stimulants. Opium if necessary. Artificial heat.
LOBELIA.	Tannic Acid. Evacuate stomach. Castor Oil.	Stimulants. Artificial heat. Opium.

POISON.	TREATMENT.	
	Chemical and Mechanical.	Physiological.
MERCURY and its COMPOUNDS.	Albumin (White of one Egg for 4 grs. Corrosive Sublimate). Evacuate stomach if vomiting has not occurred; also after Albumin.	Stimulants. Artificial heat. Opium.
NITROGLYCERINE.	Emetics and Cathartics.	Horizontal position. Cold to head. Atropine. Ergot. Strychnine.
NUX VOMICA—. STRYCHNINE, BRUCINE, etc.	Charcoal, Tannic Acid, or Potassium Permanganate. Evacuate stomach quickly before convulsions. Tube, or Apomorphine hypodermic.	Horizontal position in dark, quiet room. Artificial respiration. Chloroform for convulsions. Atropine. Bromides. Chloral. Opium. Urethane.
OPIUM— LAUDANUM. PAREGORIC. MORPHINE. CODEINE. HEROINE, etc.	Potassium Permanganate, or Tannic Acid. Evacuate stomach.	Keep patient awake by flagellation, walking, electricity, etc. Amyl Nitrite. Atropine. Strychnine. Digitalin. Coffee, Cocaine, Tinc. Capsicum, orange or lemon juice. External heat. Artific. respiration.
PHOSPHORUS.	Copper Sulph. Old Oil of Turpentine, Pot. Permang. or Hydrog. Perox. early. Evacuate stomach. Magnesium Sulphate. (No fats or oils.)	Opium. Oxygen inhalations. Artificial heat.
RHUS (POISON IVY, POISON OAK, POISON SUMACH).	Apply: Grindelia Rob. Alum. Alc. Sol. of Lead Acetate. (Avoid oils and fats.) Give Mag. Sulph.	Opium to quiet.
SILVER COMPOUNDS.	Sodium Chloride. Evacuate stomach. Demulcents of albumin, milk, etc.	Opium. Stimulants if necessary.
STROPHANTHUS.	Tannic Acid. Evacuate stomach. Saline cathartic.	Chloroform or Ether inhalations, Chloral or Bromide. Artif. respiration.
SULFONAL. TRIONAL.	Evacuate stomach. Magnesium Sulphate.	Stimulants.
TOBACCO.	Tannic Acid. Evacuate stomach.	Horizontal position. Cold to head. Strychnine. Artificial heat.
VERATRUM.	Tannic Acid. Evacuate stomach.	Horizontal position. Fresh air. Stimulants. Artif. heat. Opium. Electricity.
ZINC COMPOUNDS.	Tannic Acid. Evacuate stomach. Bicarb. Soda. Albumin. Lime-Water. Soap. Mucilage. Milk.	Morphine. Hot fomentations.

PART III.

THE INDICATIONS OF VARIOUS SYMPTOMS IN POISONING.

(AN AID TO DIAGNOSIS OF THE POISON)*

BLINDNESS.

Suspect: Wood Alcohol, Barium, Digitalis, Quinine, Nicotine, etc.

BREATH (Specific Odor of Breath).

Suspect: Acid Hydrocyanic, Alcohol, all ethereal oils, Ammonia, Amyl Nitrite, Amylene-hydrate, Bromine, Bromoform, Chloroform, Creosote, Ether, Brominated Ether, Iodine, Iodoform, Nitro-benzene, Opium, Paraldehyde, Pental, Phosphorus, salts of Tellurium, Camphor, Tobacco, Formaldehyde, etc.

BREATH (Phosphorescence of Breath).

Suspect: Phosphorus. (Also Garlic-like odor.)

COLLAPSE.

Suspect: Concentrated corrosive acids or alkalies, Antimonial preparations, Arsenic, Colchicine, Aconite, Nicotine.

COMA, PROFOUND.

Suspect: Alcohol, Aniline Oil, Belladonna, Carbon Monoxide, Chloral and its analogues, Chloroform and its analogues, Coal Gas, Opium or Morphine, Oxybutyric Acid, Sulfonal, Trional.

*See also pages 329-336.

CONVULSIONS, SEVERE; OR TETANUS.

Suspect: Aconitin, Ammonia salts, Cocaine, Condurangin, Corydalin, Cicutoxin, Cornutin, Cytisin, Digitaliresin, Filicic Acid, Gelsemine, Guanidin, Picrotoxin, Ptomaines, Strychnine, Tetanus bacillus toxin, Thebaine, **Antimony, Arsenic, etc.**

COUGH, BARKING, AND APHONIA.

Suspect: Allantotoxin, Atropine, Hyoscyamine, Scopolamin, etc.

CYANOSIS.

Suspect: Anilin, Acetanilid, Benzocoll, Exalgin, Nitrobenzene, Phenacetin, Toluidin.

DEAFNESS AND BLINDNESS (More or Less Complete).

Suspect: Aconite, Belladonna, Cocaine, Conium.

DEATH, QUICK AND SUDDEN.

Suspect: Acid Hydrocyanic, Acid Carbolic, Carbon Dioxide, Creosote, Potassium Cyanide or other cyanides. **Strong Ammonia, Oxalic Acid.**

DELAYED SYMPTOMS.

(First symptoms of poisoning 12 to 24 hours after eating).

Suspect: Arsenic (not in solution), Mushrooms containing Phallin, Virus of rabid animals.

DEPRESSION, MENTAL.

Suspect: Alcoholism, Cocaine habit, Morphine habit, Maydism, Mercurialism Ergotism, Etherism, Saturnism, Carbon Disulphide, Iodoform.

DIARRHŒA WITH VOMITING.

Suspect: Antimony and substances containing it, Arsenic and substances containing it, Colchicine,

Colocynths, corrosive poisons, Croton Oil, substances of the Digitalin group, Emetin, Muscarin, Nicotine, Pilocarpine, etc.

DISCOLORATION (Black and Blue Peripheral Parts of Body).

Suspect: Gangrenous Ergotism.

DISCOLORATION (Skin Dark and Muddy).

Suspect: (If not Blue) Poisoning by Arsenic (Arsenical-melanosis), Copper, Lead, Mercury.
(Blue or Argyria) Silver preparations.

DISCOLORATION (Discolored Tongue and Mucous Membrane of Mouth).

White: Carbolic Acid, corrosive acids, corrosive alkalies, corrosive metallic salts.
Brown: Bromine, Iodine.
Yellow: Nitric Acid, Picric Acid.
Reddish-Yellow: Salts of Chromic Acid and Bichromates.
Greenish-Blue: Paris Green, salts of Copper.

DISCOLORATION (Icteric, or Pseudo-Icteric, Yellowish-Brown Discoloration of the Conjunctiva or of the Skin).

Suspect: Amyl Nitrite, Arsine, Helvellaic Acid, Phosphorus, Phallin, Potassium Chlorate, Pyrogallol, Saponin substances, Sodium Nitrate, Solanin.

Emaciation: From prolonged poisoning by Arsenic, Lead or Mercury, secondary effects of corrosives.

ERUPTION (Acne)

Suspect: Bromides, compounds of or substances which contain Antimony, arsenicals, Emetine, iodides. Boric Acid (papular).

ERUPTION (Clear Vesicles on Skin or in Mouth).

Suspect: Preparations of Cantharides, Crowfoot, etc.

ERUPTION (Eczematous).

Suspect: Anilin (externally), Carbolic Acid, Cardol, Cinchona (dust of the bark), Croton Oil, Curcas Oil, Sulphonal, Tar, Vanilla (poor quality).

ERUPTION (Nettle, Scarlatinal or Measles-like Rash).

Suspect: Antipyrine, Atropine, Belladonna, Balsam of Copaiba, Chloral, Cubebs, Hyoscyamine, Iodine, Morphine, Quinine, Antimony, Arsenic, food.

GUMS (Dark Line or Border on Gums).

Suspect: Bismuth, Copper (green), Lead (blue), Mercury (bluish), Silver, Boric Acid (gray).

HEARING.

Suspect: (Impaired or Lost) Aconite, Barium, Bromism, Cinchonism, Conium, Lead, Mercury, Opium, Quinin, Salicylates, Salol, etc. (Intensified) Hydrophobia, Strychnin, etc. (Buzzing) Salicylates. (Ringing) Quinin, Tobacco, toxemias, food poisonings, Ergot, etc.

ILLUSIONS, VISIONS, ETC.

Suspect: Absinthe, Opium and Morphine, Cocaine, etc.

MANIA OR DELIRIUM (Raving Mania, Raging Delirium, or Mental Excitation).

Suspect: Alcoholism (chronic), Atropine, Camphor, Cannabis, Hyoscyamus, Cocaine, Physostigmine, Stramonium, Veratrine.

MISCARRIAGE OR ABORTION.

May be due to: Cotton Root Bark, Cornutin, Pennyroyal, Phosphorus, Rue, Savine, Tansy, etc.

ŒDEMA (of Glottis).

Suspect: All the corrosive poisons.

ŒDEMA (Pulmonary).

Suspect: Ammonia, Morphine, Muscarine, Pilocarpine.

PAIN.

Colic: Arsenic, Colocynth, Copper, Lead.
Cramp: Antimony, Arsenic, Lead.
Neuritic: Chronic arsenical poisoning.

PARALYSIS (As a rule, ascending).

Suspect: Aconite, Arsenic, Colchicine, Coniine, Curare, Ergotinic Acid, Gelsemium, Guachamaca-poison, Lead.

PERSPIRATION (PROFUSE).

Suspect: Aconite, Acetanilid, Antipyrine, Exalgin, Phenacetin, Sulfonal, etc.

PRIAPISM.

Suspect: Cantharidin, etc.

PULSE (Greatly Accelerated).

Suspect: Atropine, Hyoscyamine, Scopolamine, etc.

PULSE (Particularly Slow).

Suspect: All narcotics, Baryta, Lead, Morphine, Muscarine, Nicotine (later rapid and irregular), Opium, Physostigmine, Pilocarpine (later rapid and irregular), substances of the Digitalin group (later rapid pulse).

PULSE, WIRY.

Suspect: Baryta, Lead, substances of the Digitalin group.

PUPILS, CONTRACTED.

Suspect: Codeine, Morphine (Opium), Muscarine, Nicotine, Physostigmine, Pilocarpine.

PUPILS, DILATED.

Suspect: Aconitine, Alcohol, Atropine, Chloroform (swallowed), Cocaine (subsequently contracted), Coniine, Cytisin, Eppedrin, Gelsemine, Homatropine, Hyoscyamine, Opium (last stage), Scopolamin (Hyoscin), Stramonium.

SALIVATION.

Suspect: Ammonia, Antimony, Arsenic, Cantharidin, Crytisin, Mercury, Muscarine, Nicotine, Physostigmine, Pilocarpine, Saponin substance, etc.

SKIN, MOUTH AND PHARYNX, VERY DRY.

Suspect: Atropine, certain parts of Belladonna, Hyoscyamus, Thorn-apple, Allantotoxin (from decaying fish), Hyoscin, Hyoscyamine, Scopolamin, etc.

SKIN, MOIST.

Suspect: Aconitine, Alcohol, Antimony, Lobelin, Morphine, Muscarine, Nicotine, Opium, Physostigmine, Pilocarpine.

SKIN, YELLOW.

Suspect: Picric Acid and its salts.

SKIN, BLUE.

Silver Salts.

SPEECH.

Suspect: (Garrulous) Opium or its alkaloids. (Thick) Alcohol.

TACTILE SENSE.

Anesthesia (surface). Suspect: Aconite, Alcohols, Bromides, Cannabis, Opium, Physostigma; etc.

Hyperaesthesia (surface). Suspect: Alcohol, Opium, (habits), Arsenic.

Variation in temperature-sense (surface). Suspect: Aconite, Alcohol, Cannabis; etc.

TASTE, FOUL

Suspect: Arsenic, Copper, Lead, Mercury, Potassium Iodide, Tartar Emetic.

TEMPERATURE, MARKED ELEVATION OF.

Suspect: Cocaine, enzymes, Phosphorus, strong convulsants (under certain conditions).

TINGLING OR NUMBNESS IN LIPS OR TONGUE.

Suspect: Aconite.

URINE (Having Coloring Matter of Blood in Solution).

Suspect: Cyclamin, Solanin and other Saponin substances, Helvellaic Acid, Phallin.

URINE

- **Red:** Antipyrin, Fuchsin.
- **Claret Colored:** Sulfonal, Trional.
- **Becoming Scarlet in Air:** Santonin.
- **Reddish Yellow:** Picric Acid and salts.
- **Becoming Dark Green in Air:** Phenol.
- **Greenish:** Methylene blue.
- **Brownish or Greenish Brown:** Phosphorus, Lead, Mercury.

URINE, ACID (Containing Colorless Crystals).

Suspect: Oxalic Acid and its Salts.

URINE, ICTERIC.

Suspect: Cephalanthin, Phallin, Phosphorus, Toluene, Diamin.

URINE (Containing Methæmoglobin With or Without Hæmatin).

Suspect: Amyl Nitrite, Arsine, all corrosive poisons, Chrysarobin, Potassium Chlorate, Pyrogallol, Sodium Nitrite.

URINE (That Reduces Fehling's Solution).

Suspect: Benzaldehyde (Bitter Almond) Oil, Carbon Monoxide, Chloral, Chloroform, Formic Acid, Oxalic Acid and its salts, Phloridcin, Pyrogallol, Uranium salts.

URINE (Very Odorous).

Suspect: Ammonia, asparagus, Tellurium, Turpentine Oil (violets), and other ethereal oils; also autointoxication.

Urine (Red) Suspect: Uric acid, blood, etc. Urine (Blue; etc.) Suspect: A methyl.

URINE (Unnatural Scantiness or Suppression).

Suspect: Cantharidin, Corrosive Sublimate and other mercurial preparations, Oxalic Acid, Oxamic Acid, Potassium Oxalate.

VISION.

Amblyopia (Loss of acuteness of sight; feeble or blurred sight, with fundus or base of eye unchanged). Suspect: Tobacco, tea or coffee used in excess. A variety of amaurosis, a temporary blindness, may be caused by abuse of tobacco, by excessive use of Alcohol, Quinin or Salicin; may occur in Iodoform or Lead poisoning.

Amblyopia, or Amaurosis (more or less complete loss of sight—pupils may be unchanged). Suspect: Aconite, Alcohol, botulism, Caffein, Gelsemium, Methanol, Tobacco, Veratrum, etc.

Amblyopia with more or less deficient accommodation only. Suspect: Alcohol, Coniin, Conium, Methanol, etc.

Amblyopia, with more or less dilated, or contracted pupils. Suspect: Aconite, Alcohol, Cocain, Coniin, Conium, Digitalin, Dinitrobenze, Eserin (contracted), Gelsemium, (Gelsemin), Loco Weed, Nitrobenzene, Quinin, or Veratrin; botulism, ptomain-poisoning—food poisonings; chronic Anilin or Nicotin poisoning; etc.

Diplopia (Double Vision). Suspect: Belladonna, Conium, Gelsemium, ptomain-poisoning, various food poisonings; etc.

Double vision, or dimness of vision; more or less paralysis of accommodation. Astigmatism. Perhaps a total blindness. Suspect: Aconite, Belladonna, Hyoscyamus, Methyl Alcohol (sudden blindness), Stramonium; etc. (Usually pupils are dilated, but sometimes normal, unsymmetrical, or contracted.)*

Mydriasis (extreme dilatation of pupil) with paralysis of accommodation. Suspect: Alcohols, the atropa; Belladonna, (Atropine, Homatropine, etc.), Duboisin, Gelsemium, Hyoscyamus, Mandrake, (Scopolamin), Stramonium; ptomain-poisoning; etc.*

Myosis (Contracted pupil; or, Pin-Hole, or Pin-Point Pupil). Suspect: (Aconite 1st stage?), Amyl Alcohol, Opium, Morphin, Physostigmin; etc.

Some ill-defined disturbance of vision (with perhaps slight pupillary dilatation). Suspect: Belladonna or Atropin combined with Opium or Morphin, possibly with Codein; also a botulism; food poisoning; etc.

Blue. Suspect: Alcoholism; etc.

Brownish. Suspect: Coffee, etc.

Green. Suspect: Cinchona or Santonin; etc.

Red. Suspect: Duboisin; etc.

Yellow. Suspect: Gelsemium, or Santonin, etc.

Photophobia, (Intolerance of light). Suspect: Cinchonism, or Arsenic poisoning.

If an object appears larger or smaller than it should: Suspect: Poisoning by Cannabis Indica.*

(Memo): Atropin, Homatropin, Cocain and Scopolamin dilate the pupil of the eye. First two and Scopolamin paralyze accommodation; Cocain only slightly impairs it. First two used in eye 2 grs or more to oz. (Apply one or more drops); Cocain in 2 to 4% sol. (Apply a few drops); Scopolamin, Hydrobromid, use in $\frac{1}{10}$ to $\frac{1}{5}$ of one per cent solution. (Apply 6 or 7 drops).

Eserine contracts the pupil. (One drop of a one per cent solution used in the eye.)

[Delirium (toxic)—illusions, hallucinations, etc—Suspect: Alcoholism (acute or chronic). "Nearly all poisons, notably the vegetable narcotics, and narcotico-

acrids, are apt to produce delirium:"—Woodman and Tidy. Dread: Alcohol, hydrophobia, sometimes Opium, Cocain; etc.].

[Delusions, illusions, hallucinations. (Without actual delirium.) Suspect: Alcohol, cocain, hyoscyamus, hyoscin, wormwood; etc.].

[Visions; "Spectres"—such as rats, mice, beetles, animals, "devils," "ghosts," etc. Suspect: Alcohol, Lead, Mercury, etc.].

*[See charts for tests]

VOICE.

(Loss of) In Barium, Lead paralysis, Trichinosis, etc. (Rough) Belladonna, etc.

VOMITING.

Suspect: Aconite, Ammonia (stringy saliva, perhaps blood), Antimony (mucus-white, stringy, perhaps bloody), Arsenic (brown, with blood), Colchicum, Colocynth, Digitalis (grass-green vomit), Phosphorus (vomit luminous in dark), Antimony, Zinc (incessant vomiting).

VOMITING AND PURGING.

Suspect: Antimony and substances containing it, Arsenic and substances containing it, Colchicin, Colocynths, corrosive poisons, Croton Oil, substances of the Digitalin group, Emetin, Muscarine, Nicotine, Pilocarpine; etc.

VOMITING, WITHOUT DIARRHŒA.

Suspect: Apomorphine, Cytisin, Lobelin, Narcissin, etc.

PART III*a*.

THE SPECIAL SENSES.

DETERMINATION OF THEIR CONDITION FOR RECOGNITION OF THE TOXIC EFFECTS OF CERTAIN POISONS

(See pages 253 to 260*b*)

VISION TESTS

NB. At the indicated distances, these test types of Brundage's Manual of Toxicology, 14th edition, copyrighted, 1923, by the Henry Harrison Co., afford a person quite definite information as to whether his sight is normal or abnormal.

[Test your eyesight! Ascertain if you are being poisoned by excessive use of coffee or tea, etc. By employing the tests and the references above indicated, supplemented in some instances by other tests logically indicated and elsewhere provided, those persons who have been in the habit of using very freely either coffee, tobacco, or alcoholic beverage, quinine, or one of the common nerve or heart sedatives or stimulants, or some very insidiously deleterious substances, may discover they are unconsciously optically suffering from the injurious effects of such excessive use, or from a chronic auto-intoxication from overeating or from eating wrong food, and need medical treatment or eyeglasses or both.]

In reading each of the series, the respective type being read should be placed or hung nearly on a level with the eyes, and in a strong, preferably natural light. Care should be taken to avoid shadows. Each eye should be tested separately, one eye being covered—but not pressed upon—with a card, black paper, or the cupped-palm, held closely in front of it, while the other eye is being tested.

Diminution in Vision: De Guret averages usual diminution in acuteness of vision as follows: At 50 years of age the acuteness is diminished one-fifth; at 60 years one-fourth; at 70 years one-third; at 80 years one-half.] The pupil is 4 mm. in diameter in the average adult; smaller in old age. The visual center is in the cuneus of the occipital lobes.

For Nearby Readings

B

"It was much left easy to answer the chiefs of the opposition when they set forth the danger of breaking down the partition which separates the functions of the legislator from those of the judge. "This man," it was said, "may be a bad Englishman; and yet his cause may be the cause of all good Englishmen. Only last year we passed an Act to regulate the procedure of the ordinary courts in cases of treason. We passed that Act because we thought that, in those courts, the life of a subject obnoxious to the government was not then sufficiently secured. Yet the life of a subject obnoxious to the government was then far more secure than it will be if this House takes

At D–0.25 meter—25 centimeters—(4 diopters). (Normally read at about 10 inches)

R

If placed in a good light, these words should be read, by the normal eye, at about 16 inches from the eye. [Refer to pages 253 to 260*b* of Brundage's Manual of Toxicology, indicating effects on vision produced by certain poisons.]

At D–0.40 meter (2.5 diopters). (Normally read at about 16 inches)

U

DELT CLIFFS DEEP SELLS
TOOL GHOTEUDLASIC HOLED
FELT CLOTHE SEAL CRIED
COLD LODGER BALL BOOTS

At D–0.50 meter (2 diopters). (Normally read at about 20 inches)

N

BET LET FAT FOES
ROD DEOHSUDTL RODE
SEE SET LEE TELL
COD HOD COO TOED

At D–0.75 meter (1.25 diopters). (Normally read at about 30 inches)

D

DLSTUEOHCF
DELL SOLE FELL
ROOT HOCEFSDUTL
FLOG POLE CELL
GOLD RUDE BEET

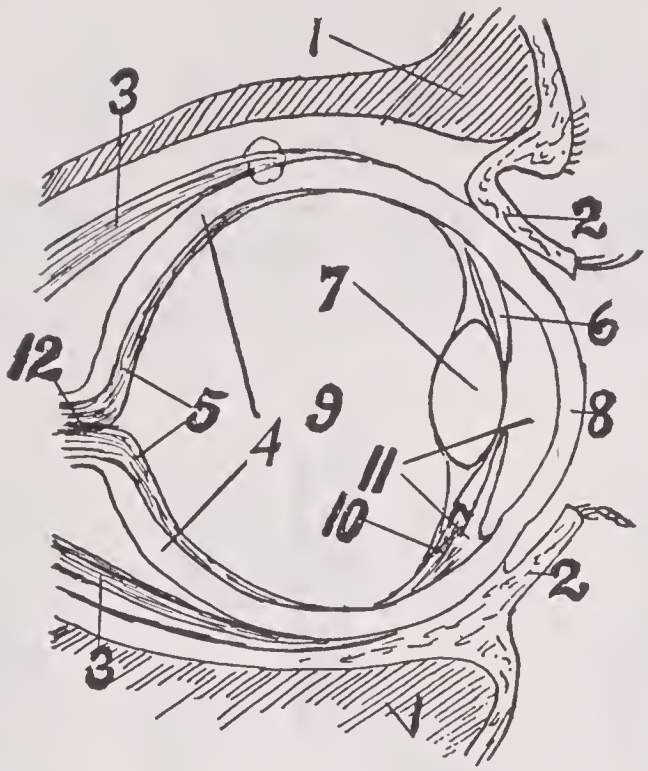
At D–1.00 meter (1 diopter) (1 meter = 39.3701 inches). (Normally read at about 40 inches)

A

TOLD SLED
LFSDCEUTOH
BATH FEUD

At D–2.00 meters (.50 diopters). (Normally read at about 80 inches)

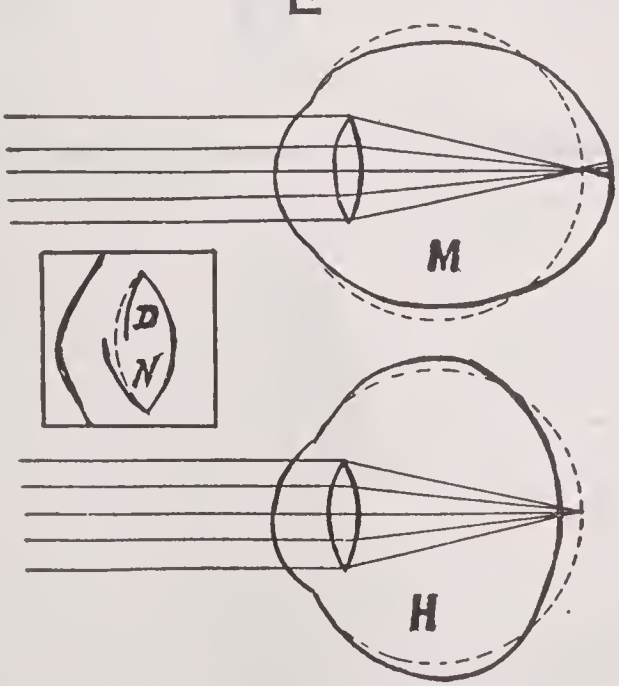
G



KEY.

1—orbital bone.
2—eyelid.
3—muscle which moves eyeball.
4—sclerotic.
5—retina—corresponds to photographic plate of a camera.
6—iris or colored curtain. Variable hole in center (for light) is called the pupil.
7—crystalline lens.
8—cornea (transparent tissue which admits light to retina).
9—vitreous humor.
10—ciliary muscle—controls shape of lens.
11—aqueous humor.
12—optic nerve—divides into fine threads ending in rods in retina.

E



M—Myopic or short-sighted eye. (Has a long diameter.)
H—Hyperopic or hypermetropic or far-sighted eye. (Has a short diameter.)
Dotted lines indicate normal eye.

Insert illustrates way in which normal lens accommodates itself to near and far objects:
D—shape of lens when viewing distant (D) objects.
N—shape of lens when viewing near (N) objects.

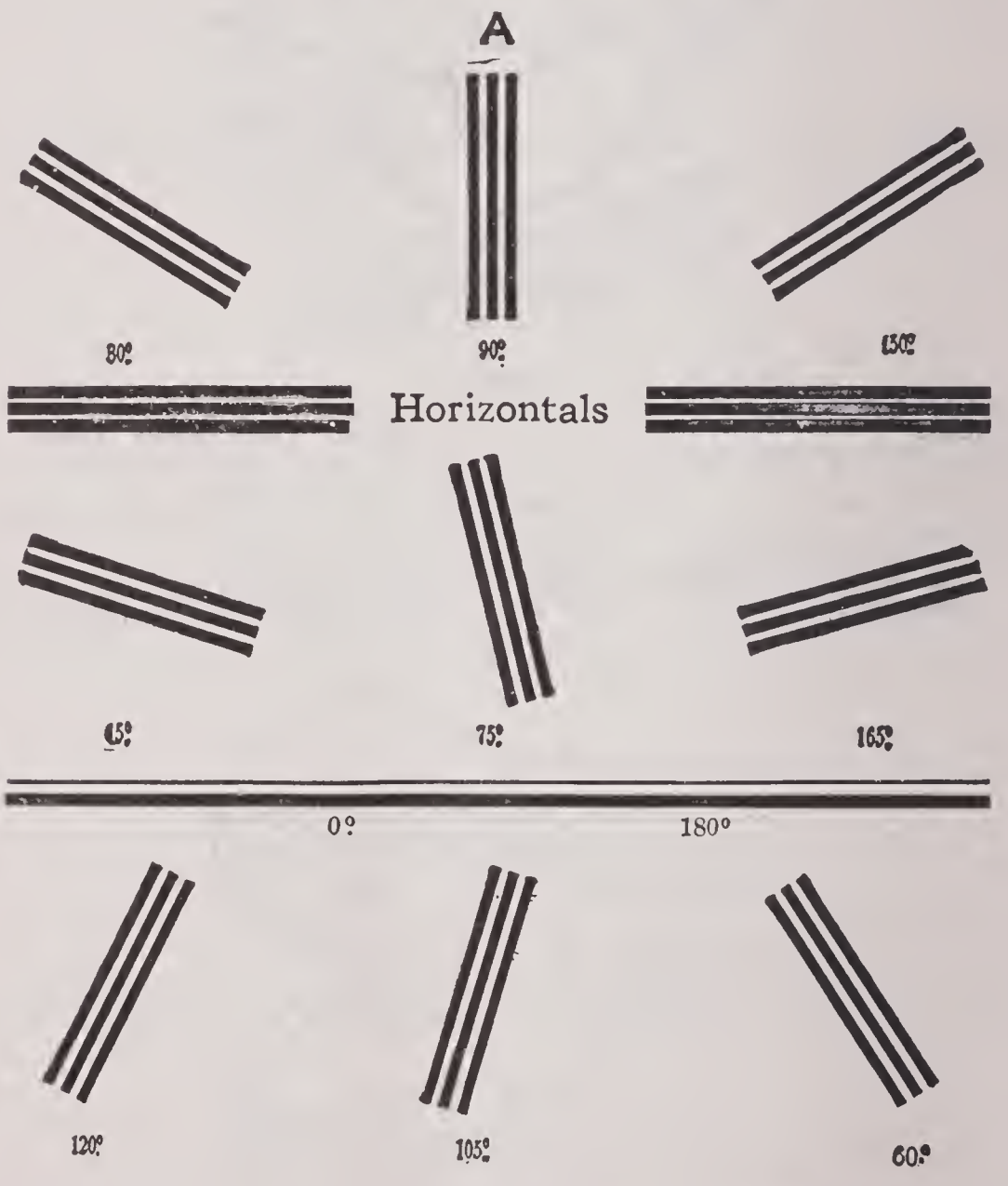
For Distant Readings

M

T D R P L A E O F

2 6 8 3 6 0 5 8 3 9 4

At D–3.00 meters (Normally read at about 10 feet)



For Astigmatism Tests.

(Test at about 10 ft. in strong light or at 8 ft. in fair light.)

In an astigmatism, at certain angles the lines will appear hazy, or fuzzy on sides or at ends, or of different widths or spacings, or run together. All angles may be indistinct but usually those between 90° and 160° are least affected and horizontals and verticals most.

N

2 3 SAVE 8 9

HEALTH

At D–4.75 meters (Normally read at about 15 feet)

U

RHDAHO

TZFERA

4 8 6 3 9 5

At D–6.00 meters (Normally read at about 20 feet)

[Normal vision is known as emmetropia, and rays of light portraying an object are focussed directly upon the retina. In short sight or myopia the eyeball is elongated, or the lens too thick, and the rays are focussed before they reach the retina. In far sight or hypermetropia, the eyeball is too short, or the lens too thin, and rays are not yet focussed upon reaching the retina. In the failing sight of old age, called presbyopia, usually beginning somewhere between 38 and 45 years of age, the power of the eitiary muscle is diminished and it is less able to alter the shape (requisite forcussing or accommodation) of the lens, and the lens is less flexible, more dense, and the eye more flattened.

In testing the sight, the normal distance ("D"), at which a given sized type should be read, is the numerator of a fraction; the denominator of which is represented by the distance at which it is read, or by the size (for another distance), which is the closest approximation to the normal size and distance there possible by the person being tested.

Thus the vision of an eye which reads at 20 feet (the usual test distance) the type normally read at that distance is represented as $\frac{20}{20}$. But if able to read no smaller than that normally read at 30 feet is represented as $\frac{20}{30}$; etc. A myopic eye requires a concave-spherical lens. A hypermetropic eye requires a convex--spherical lens. An astigmatic eye requires a convex or concave cylindrical lens. A sphero-cylindrical may be required.]

N. B. By unfolding page *260j* and displaying it with pages *260f* and *260g*, types for all the distances through 60 feet may be displayed simultaneously. By placing the Toxicology on a shelf or table, or pile of books on such, and leaning a heavy ruler, on edge, against the bottoms of the pages, vision tests of a seated person may be made quickly.

TEST TYPES FOR HALF DISTANCE READINGS BY MEANS OF MIRROR

A

T D F H E C L O

Type for 10 feet, normal distance, direct test.
(By mirror reflection at 5 feet)

L

L T F O D E A

Type for 15 feet, normal distance, direct.
(By mirror reflection at 7½ feet)

OF

L D F T O Z

Type for 20 feet, normal distance, direct test.
(By mirror reflection at 10 feet)

T

Z L C E

Type for 30 feet, normal distance, direct test.
(By mirror reflection at 15 feet)

For test by mirror (reflection):—The mirror should be 5 feet away from and in front of the reader's eyes; and the test type at the side of the eyes (or, if the type be placed just behind the head, make proportionate allowance for additional distance. (Also, reader may face mirror, *close* to it, and the type be placed a proportionate distance behind his eyes, making allowance for distance from his eyes to mirror).

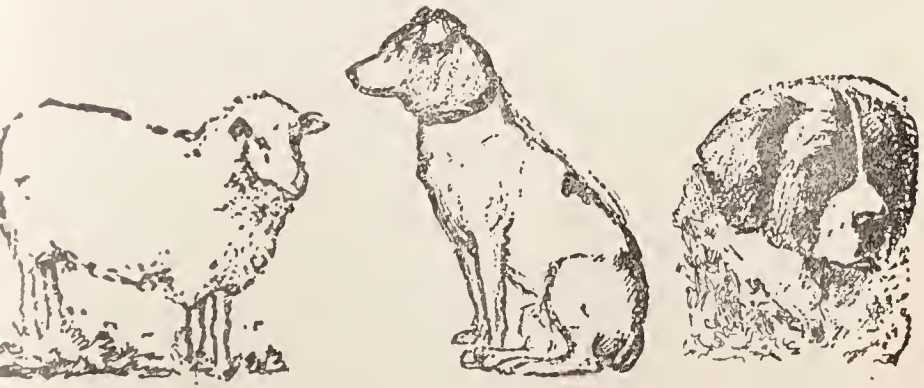
O

At D–4.75 meters. (Normally read at about 15 feet.)
[For testing the vision of a very young child, or of an illiterate person.]

X

At D—6.00 meters (Normally read at about 20 feet)
[For testing the vision of a very young child, or of an illiterate person.]

I



At D–about 12 meters. (Read at about 40 feet.) (Sheep).
At D–about 14 meters. Read at about 45 feet.) (Dogs).
[For testing vision of illiterate person]

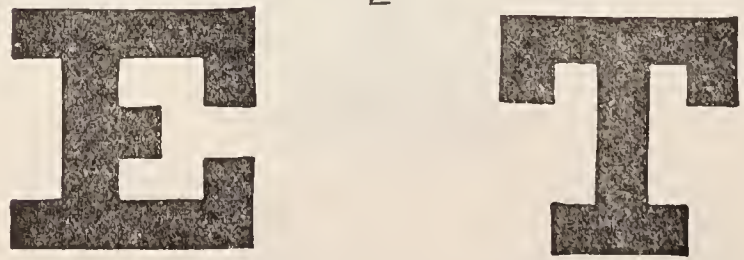
C

At D– 9.00 meters (about 29½ feet—approximately 30 feet)

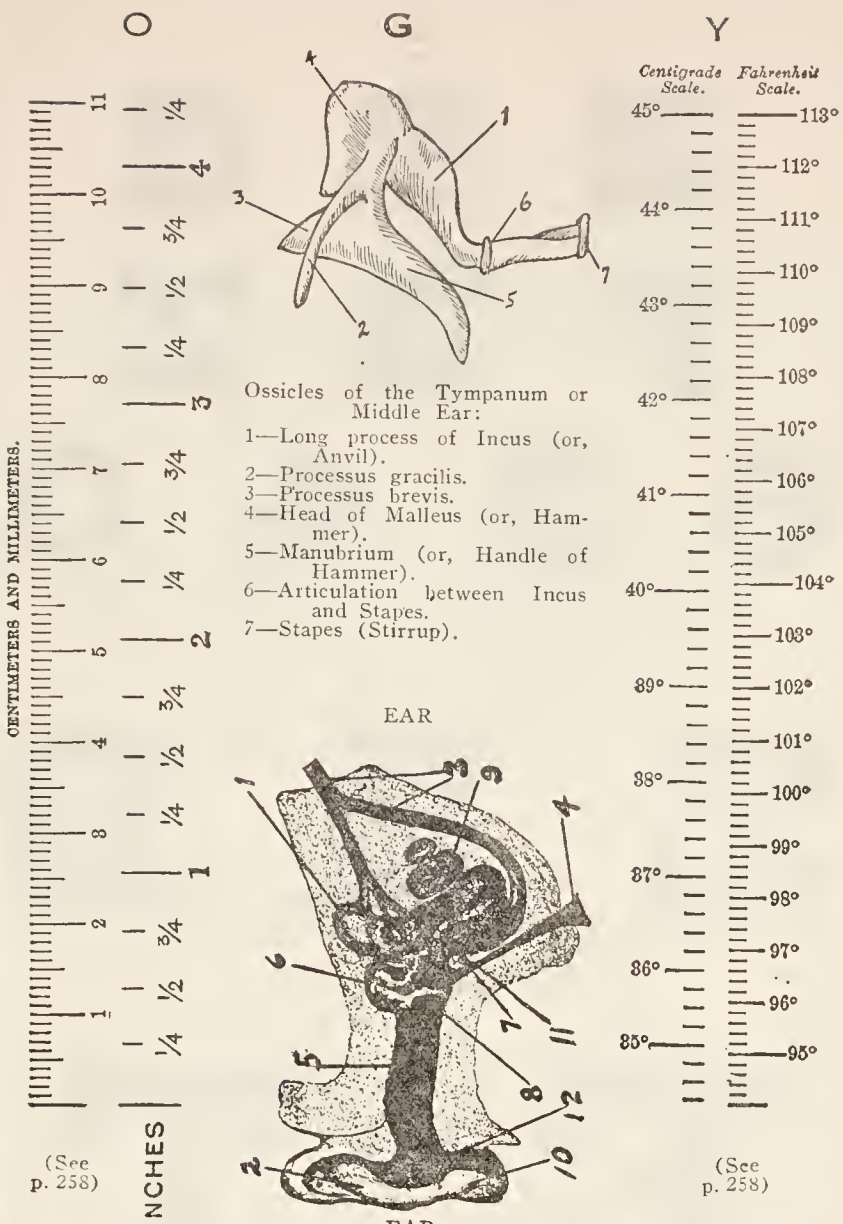
O

At D– 12.00 meters (Normally read at about 40 feet)

L



At D—18.00 meters (Normally read at about 60 feet)



Ossicles of the Tympanum or Middle Ear:

1—Long process of Incus (or, Anvil).
2—Processus gracilis.
3—Processus brevis.
4—Head of Malleus (or, Hammer).
5—Manubrium (or, Handle of Hammer).
6—Articulation between Incus and Stapes.
7—Stapes (Stirrup).

EAR

EAR

1—Semi-circular canal.
2—Concha.
3—Auditory nerve.
4—Eustachian tube.
5—External auditory meatus.
6—Middle Ear (Drum or Tympanum).
7—Vestibule.
8—Membrana tympani (Drum-head).
9—Cochlea.
10—Lobule.
11—Oval window (closed by stapes).
12—Concha.

HEARING TESTS

There are various methods of testing a person's hearing in order to determine whether his hearing is normal or defective. Before applying any such tests, the ears should be carefully examined for the presence of ear-wax; and if such be found, it should be removed prior to employing the tests.

The tick of a watch is one of the two means most commonly employed for testing the hearing, i e., to determine whether a person's hearing is normal or defective; and if defective, to what extent. Before the tick of any watch is used for such purpose, the tick of that watch should be tested by trying it upon a number of persons known to have normal hearing, and its suitableness for the testing of hearing, thus definitely and fully determined. Unless the method pursued in testing the tick of that watch conforms to and complies with the following, the respective watch-tick should not be used to test the hearing:

All hearing-tests and watch-tick tests should be made in a quiet room. The watch used should be well wound at the time of testing. In testing, it should be held half-covered by the hand, so that a turn of the wrist will interpose the hand and cut off most of the sound of the tick, in confirming responses. The person upon whom the test is made should keep his eyes closed during the tests to avoid being influenced by position or motions of the tester. While one ear is being tested, the aural orifice of the other should be obstructed by the tip of the finger, or otherwise securely plugged. The test should begin with the watch being held beyond the hearing distance of its tick, but on a level with, and directly in front of the aural orifice of the ear being tested. It should then be brought quietly and gradually towards the patient's ear, until its tick is clearly and distinctly heard by him. This fact he should be instructed to indicate by raising the forefinger of his partly uplifted, nearer hand. A person having normal hearing will hear, clearly and distinctly, under these conditions, a duly loud and distinct watch-tick, at some point between 60 and 30 inches away from his aural orifice, as his most distant point. Such point is known as his hearing-distance; but his hearing-distance will vary its place or point in the 60 to 30 inches area, according to the intensity and clearness of the watch-tick with which the test is made. Therefore, there is practically a hearing-distance for the watch-tick as well as for the person; and that for a suitable watch-tick must lie also somewhere within the 60 to 30 inches area. With one such, it may be at 60 inches; with another, at 40 or 50 inches; etc. With each suitable watch, it will be at the most distant point in the accepted area, where its tick is duly heard by the majority of a number of persons whose hearing is normal. Such determination of hearing-distance is not quite absolute, but

nearly enough so as to well serve all ordinary and practical purposes.

In testing the watch-tick of a watch, it should be noted which side of the watch emits the more suitable tick; and if the watch have a closed case, whether the latter should be used open or closed.

If the hearing-distance of a suitable watch-tick is 50 inches from the aural orifice of each of several persons having normal hearing, the 50 would be the denominator or base of all fractions used to indicate the hearing ability of various persons tested by that watch-tick. With another suitable watch-tick it might be, as has been indicated, 40, 45, or 60; etc. The numerator of all such fractions would be the distance at which the person being tested, properly hears the watch-tick. If the denominator of the watch-tick is 50 and the hearing of the person being tested is normal, in each ear, the fraction, for each ear, will be 50/50. However, if it is normal (50/50) in one ear, but with the other he can not properly hear the watch-tick farther away than 30 inches, the fraction for that defective ear is 30/50. If the denominator of a suitable watch-tick is 40, but a person can not properly hear it farther away than 20 inches with the right ear, and not farther away than 10 inches with the left ear, the result of the tests would be recorded thus: Hearing Distance, Right (or, H.D.R.) 20/40. Hearing Distance Left (or, H.D.L.) 10/40. Or, if using this same watch-tick, it can be properly heard by some other person only when the watch is placed in light contact with the ear, the record would be C/40 for each ear so deficient; or, if heard only when pressed firmly against the aural orifice (if elsewhere should be so stated) it would be recorded as Pr./40; etc. If the watch-tick cannot be heard in any of these three ways the hearing would be recorded as 0/40 for each ear so deficient. Imperfect hearing of watch-tick is quite common in cases that hear other sounds well; and it may be audible, actually, by bone-contact, to persons who have no hearing through the aural orifice.

Voice sounds also are much used in testing the hearing; but voices vary greatly in volume, pitch and timbre, and the same voice varies also at times. As a rule the whispered voice is better than the loud voice, on account of the usually small testing place, and of the greater regularity in tone of the whispered voice. Vowels are heard farther than consonants, and music, better than speech. Numerals should be used in testing, also the names of different States and cities, and other words which vary in proportion of vowel and consonant sounds. The patient should repeat the words after the examiner. The eyes should be kept closed to avoid lip-reading.

The following method of testing the hearing is used in the U. S. Government service: Each ear is tested by occluding the aural orifice of its mate, and by directing the conversation

from various points and from such positions, as will exclude lip-reading. Slight deafness of one ear is based upon inability to hear ordinary conversation at 6 feet; severe deafness, of such, by inability to hear loud conversation at 3 feet. Nearly total deafness, of such, by inability to hear the loudest distinct conversation at one foot; total deafness, of such, by inability to hear the loudest conversation. The distance at which the patient can hear each of the above stated standard tones is to be stated, also. The human voice is able, especially in whisper, to test the hearing through many octaves, and "forms the readiest and often the best test at our command." Loud, medium, and low voice, stage whisper, and low whisper are fairly definite terms; and test words like the cardinal numbers, such as one, two three, etc. (not first, second, third, etc.) up to 100, give ample variations and combinations of pitch. The few questions of the primary history taking, asked in a just audible tone, give the careful examiner a fair gage of the patient's defect; and having him repeat the last words, gives good control as regards the acuity of the hearing. The average distinct whisper may be heard, in a quiet room, at a distance of about 25 feet. As a standard, it may be stated that a stage whisper, spoken with the "reserve air" after an ordinary tidal expiration, should be heard about 16 feet in a quiet room; the high, sibilant sounds of S and X are most audible, usually. Faint, clear whispers should be heard at about 3¼ feet.

It should be remembered that the degree of vitiation of a special sense function may serve, helpfully, to indicate moderate or severe effects in the toxic action of various poisons.

SUPPLEMENTARY EXPLANATIONS AND TESTS

HEARING:

[In testing the hearing, tuning forks and Politzer's sound meter or acoumeter are among the various means sometimes employed. Probably the latter is the most precise and uniform of all test methods; but is not very commonly used seemingly because it is rather complicated and somewhat expensive.

Tuning-forks are practically requisite in closely distinguishing between diseases of the transmitting apparatus and of the receiving apparatus. A set of five tuning forks is desirable, tuned from 128 to 2048 vibrations per second. They are the Cs of 4 octaves upward, beginning at the C below middle C of the piano. In employing but one tuning fork for general purposes that of 512 vibrations per second (the universal standard of pitch) which is the C one octave above middle C of the piano, should be selected. The fork-test for determination of hearing ability is made through the air, in about same way as the ordinary watch-tick-test. For testing by bone-contact and bone-conduction of sound, the end of the handle is rested upon the mastoid process, the vertex of the skull, the upper teeth, or the forehead, with the shaft at right angle to the surface of the bone. In nerve deafness low-pitched sounds are heard

best. In an obstructive deafness or affection of the middle ear, high-pitched sounds are heard best. In testing one ear its mate should ordinarily be plugged.—If, in an obstructive deafness, a rather high-pitched tuning fork be placed on the middle of the forehead, it will be heard loudest in the deaf ear; if in nerve deafness, it will be heard loudest in the sound ear; if tuning fork vibrations or a watch-tick are heard faintly, or not at all, away from the ear, but are quite audible when the fork-handle, or the watch, is placed in contact with the skull, the deafness is due to aural disease; but if fork sounds or watch-tick are not heard, or only slightly heard, both in contact, and at a distance, the deafness is the result of some lesion of the auditory nerve itself or of its connections, according to D. G. R. Butler.—The lesion may be caused by some poisoning. Ringing (or singing) in the ears, or deafness, or both, may be caused by a poisoning with the cinchona alkaloids, salicylic acid, or the salicylates, alcohol, ergot, over-use of tobacco, various food-poisonings; etc. All ear-wax should be removed, of course, before applying any of these tests. Pressure of ear-wax against the ear-drum may simulate the effects of poisonings by certain poisons. Regarding hysterical deafness, Dr. Butler says that it affects one ear, occurs suddenly, and usually after great emotion or shock.

TACTILE (TOUCH), PRESSURE AND WEIGHT TESTS:

The tactile sense may be tested by drawing the tip of a lead pencil, or of the forefinger, lightly along the skin surface—the person being tested to have his eyes shut and to announce consciousness of contact as it occurs; or, the blunted (by adhesive plaster or cork) points of a pair of compasses, or the bare points of a hair-pin, simultaneously and lightly applied to the skin, or likewise to the tongue, at varying distances between the points, may be used to determine differences in delicate perceptions by various parts of the skin, or of the tongue. Sensation of contact at two points simultaneously, should normally be perceived at about the distances apart below expressed in millimeters and at the respective regions or sites therein stated. Perception of two distinctly separate but simultaneous contacts, with the two points of the compasses, at notably shorter distance between them than stated below, would indicate some degree of hyperesthia at such location. Such perception only at a notably greater distance would indicate some degree of anesthesia:

At the upper back or shoulder region 80 to 60 mm. At the mid-dorsal and lower dorsal region of the back 69 to 62. At the mid-thigh and mid-forearm and mid-cervical regions, each 62. At back of neck near skull 50; at middle of back of neck 37. At upper and lower forearm region 40 to 37. On legs, and over about ¾ of posterior part of dorsum (or back) of foot 40. On dorsum (or back of foot) near base of toes 37. Over buttocks region 37. Over back of hand 32 to 25 (1 1/5 to 1 inch). On forehead near eyebrows 22. On dorsum or back (skin surface) of innermost bones of fingers 14. At tips of toes, on the temples, eyelids, and cheeks, each 12 (about ½ inch). On palm of hand 9. On middle region of tongue (by touch sense only) 8. At tip of nose 8 to 6. Palm side (skin surface) of second row of finger-bones 4. On mucous surface of lips 1 to 3. Palm side of tips of fingers 2 (1/12 inch). Tip of tongue 1 mm. (1/25 inch).

In slight local anesthesia, localization (dependent upon contact or tactile sense with muscular or weight sense) may be determined, Dr. Butler suggests, by touching the skin with the tip of the finger, the patient's eyes being kept closed and the patient asked to put his finger on the same spot: "A variation of more than two inches is considered abnormal."

Increase in closeness of contact produces pressure sense, which upon increase may merge into a weight sense, and may finally result in a sensation of pain.

The relative pressure sense of the body may be tested, it is suggested by Dr. Butler, in the following manner: Coins of different weights, but of about the same size may be laid upon the supported (at rest) forearm, back of hand, temple, forehead or abdomen and the patient requested to tell which is the heavier coin.—He says the muscular sense may be tested in the same way by not supporting the part being tested.

TEMPERATURE TESTS:

The temperature sense, or skin sense of change in temperature, may be tested by using glass tubes of hot and cold water respectively. As the surface is touched with each tube in succession, the patient should state whether the respective tube appears to be hot or cold. The tester should note the correctness or actual reversal of facts, in the responses. The tester should note the correctness or actual reversal of facts, in the responses. If 60° F. to 65° F. are not called "cold," and 85° F. to 95° F. are not called warm, the temperature sense is not normal.

Different parts of the surface of the body vary in temperature sense—even points close to each other. In testing, for example, the back of the hand, it will be observed that certain spots or points are more sensitive, normally, to heat, than are others. Still other spots it will be observed are more sensitive to cold and neither of these will respond to the reverse stimulus. (See Butler, Brubaker, Kirke, Ott, etc.) Under certain interferences with sensation, as the deadening effects of powerful drugs, etc., the temperature sense is diminished or lost, as is also the muscular sense or sense of weight—controlled by the sensations of pressure on the skin and of muscular resistance. The recognition of the size, form and general character of a body or mass is also dependent upon the absence of damage to the associated senses. Loss of, or marked diminution in, such perceptions are significant usually of the operation of deleterous influences.

(The average temperature of the mouth is 98.5° F. (36.9° C.) to 98.6° F. (37° C.); of the rectum 99.5° F. (37.4° C.); in the axilla, and in the groin, the average is 98.6° F. (37° C.) There is a normal variation of one or two degrees in various internal parts of the body, dependent upon the blood supply to the respective part. That part is the warmest which contains the most blood and where the greatest amount of chemical change occurs—as in the glands and muscles; and the temperature is highest in these when they are in an active state. In reduction or suspension of their activity through injury—such as shock or poisoning—or through disease, the temperature is more or less lowered either immediately or ultimately, as the vitality diminishes. The average temperature of the body, and of its parts, varies according to the foregoing and also according to climate, time of the year, the time of day, etc. The body temperature is at a lower point during sleep, owing to a low metabolism taking place at such time. The body temperature appears to average higher in young children and in women than in men.)

TASTE TESTS:

Alum tastes sour on the tip of the tongue and sweet on the back part of it. Brubaker, Ott and others have found the posterior part of the tongue more sensitive to bitter substances than the anterior; and the reverse for sweet substances. Ott says: "By the action of drugs one is able to abolish certain tastes more readily thon others. Cocaine upon the tongue abolishes tactile sensations, and the taste for bitter things, but does not interfere with voluntary movement." Salt intensifies the sweet taste of sugar. According to Dr. Butler, the taste sense may be tested by protruding the tongue and so keeping it while dropping upon its upper surface at the anterior and the posterior parts, at each side of its median line, a solution of quinin for bitter taste, of sugar for sweet taste, of table salt for salty taste, and of vinegar for sour or acid taste; but he considers the sugar test to be sufficient for all ordinary purposes. G. N. Stewart proposes the use of weak solutions, as sugar 1 to 50, quinin and sulphuric acid 1 to 1,000 for each, salt 4 to 200, etc., applied by camels hair brush to tongue to determine activity of taste sense.]

PART IV.

SIMULATION OF POISONING BY DISEASE, AUTO-INTOXICATION AND DISEASE, ACTION AND ELIMINATION OF POISONS.

(ALSO SEE PAGES 18-27, 100 AND 329; ALSO PART X.)

It is well to remember that poisoning is simulated by the sudden onset of such affections or diseases as angina pectoris, aneurism, embolism, apoplexy, epilepsy, acute pneumonia, cholera morbus, uremia, cerebral congestion, etc.

Among the diseases simulating poisoning by corrosives and irritants are acute gastritis (does not occur strictly idiopathically), gastro-enteritis, peritonitis, Asiatic and English cholera, and all of the acute inflammations of the alimentary canal, such as dysentery, also ileus, strangulated hernia, rupture of abdominal viscera, etc. Sudden death simulating the action of a powerful poison may result from a draught of very cold water when the body is much heated. Aneurism, rupture of the stomach due to efforts to vomit, rupture of the intestines, biliary ducts, uterus, Fallopian tubes, etc., also ovarian apoplexy, have each been mistaken for poisoning. Pain, vomiting, collapse, and death within 24 hours, characterized the symptoms of each; symptoms common also to irritant poisoning. The various distinctive differential features are to be borne in mind in making a diagnosis:

Purging is an earlier symptom in cholera than it is in poisoning. While pain and constriction in the throat and bloody vomit are unusual in cholera, they are quite common in irritant poisoning. In ileus and strangulated hernia there is usually constipation instead of diarrhœa, and the vomited matters are fecal.

Diseases which simulate poisoning by narcotics, etc., are uremia, epilepsy, certain fevered states, apoplexy, the effects of blows on the head, hydrocephalus, and various diseases of the nervous centers characterized by coma and insensibility, etc. In diseases simulating poisoning by narcotics there are, as a rule, premonitory symptoms, and persons of a certain age or condition are affected; but in poisoning by narcotics such are absent, and persons of any age may be affected. Apoplexy usually attacks the old, or prematurely old, and while in such poisoning as opium it is possible to arouse the patient, in apoplexy such is commonly impossible. In epilepsy the diagnosis is, as a rule, assisted by the history, the chronic character of the affection, the peculiar character and duration of the paroxysms.

Idiopathic tetanus, although uncommon, may be mistaken for the tetanus of strychnine. But in idiopathic tetanus the symptoms gradually develop and begin with difficulty in swallowing. Locked-jaw is the earliest and most prominent symptom in this form of tetanus, and is followed by stiffness of the trunk and extremities. In strychnine tetanus the symptoms develop rapidly, reaching their height in a few minutes. Locked-jaw is imperfect and may even be absent. Opisthotonos is very early and severe, whereas in idiopathic tetanus it is much less severe and its appearance is delayed for hours or days. In the latter affection deglutition is slow, difficult or impossible; in strychnine tetanus it is perfect in effect, but peculiarly gulping.

The tetanoid convulsions of epilepsy and hysteria are differentiated from poisoning by the general history of the case, the peculiar nature and order of the spasms, and rapid alternation of relaxation and contraction.

In all sudden sickness characterized by severe symptoms the physician or other observer should not overlook the possibility of poisoning, and should make the following observations suggested by Dr. Luff:

1. The time at which the symptoms commenced, and the nature of the symptoms.

2. The time at which the symptoms commenced after the last ingestion of food.

3. The occurrence of any recent previous illness from which the patient may have suffered.

4. If the patient has vomited, the vomit should be collected, or, if necessary, scraped up from the floor or from the dress, bedding, or carpet; if necessary, a portion of the dress, bedding or carpet containing the vomit should be cut out and preserved.

5. The nature of the food recently taken by the patient should be ascertained; and if suspicion attaches to any articles of food, these should be secured by the medical man and preserved under seal.

If the death of the patient occur, in addition to attending to the points above mentioned, note should be taken of the following:

1. The exact time at which death occurred.

2. The position of the body with regard to surrounding objects; its attitude, and the condition of the dress.

3. All surrounding objects should be carefully observed, and any bottles, packets, or weapons in the room should be collected and preserved.

4. The condition of the body as to lividity or pallor should be noted, and also whether the countenance presents a distressed or calm appearance.

Not only should any bottle, box, packet or vessel and contents be carefully observed, but also all clothing, cloths, furniture or furnishings which may afford a clue to the cause or condition. Important articles should be carefully secured if possible. Appearance, manner, etc., of persons present should also be noted.

Apparently many of the general disorders which seem to be related to alimentary irritation, and most of the intestinal disorders themselves, result from putrefactive disturbances in the alimentary canal, particularly in its lower porton. An auto-intoxication or toxæmia, disabling the blood and seriously interfering with general nutrition, may result from putrefactive disturbances in the alimentary canal and the absorption of the resultant toxins. The auto-intoxication may produce such symptoms as to simulate various grave diseases. Furthermore it is supposed that bacterial toxins are of the nature of ferments which bring about chemical changes in other matter and thus are capable of producing disease, as arteriosclerosis, etc. Toxins may produce gastric and intestinal irritation, causing severe enteritis, etc.

In studying the bacteriology of the intestine, we ob-

serve that what Tissier calls the "superadded flora" produce chiefly harmful effects in the intestinal canal. These organisms are anærobic and tend to produce putrefactive changes in the intestinal contents. The hydrochloric acid of the chyme, and the action of the digestive secretions of the first part of the small intestine retard the action of the putrefactive organisms. The putrefactive products are formed from the protein. The decomposition of protein is prevented and the number of putrefactive germs lessened by the production of acids from the carbo-hydrates. Vegetable sugar fermentation produces an acid reaction in the intestinal canal, destroying the anærobic organisms; but it may create other disturbances. When digestion is active there is a prompt absorption of the digestive products, leaving but little material in the intestinal canal for the production of putrefaction by action of the anærobes. [Some investigators claim that the contents of the small intestine are more poisonous than those of the large intestine. They assert that when the pancreatic juice mixes with the intestinal juice, particularly that of the duodenum, it becomes poisonous. Also that the gastric contents become poisonous when they enter the intestine and are acted upon by the intestinal juice. It is supposed that various cases called "auto-intoxication attacks" are not suffering from the effects of bacterial action, but from the decomposition effects produced by the intestinal juices on proteins of no value to the system; the protein molecule is probably irregularly split up, by which poisonous products result, which are absorbed as such or induce other changes resulting in a toxæmia.]

Tissier divides the intestinal bacteria into: the fundamental flora,—Bacillus bifidus, Bacillus coli and the enterococcus; the subsidiary flora,—organisms which accompany various articles of food, influencing the production of acid, and therefore serve to support the fundamental flora in their salutary action; the superadded flora, composed of a number of pathogenic organisms whose effects in the intestinal canal are

largely harmful,—Bacillus ærogenes capsulatus, etc. The foul-smelling gases NH_3, H_2S and NH_4HS are produced during putrefaction. Antiseptics (as salol) check putrefaction by destruction of the germs concerned in its production.

Herter gives three varieties of disorder referable to bacterial infection and intoxications of intestinal origin, viz.: the saccharo-butyric, the indolic, and the indolico-saccharo-butyric disturbances. The strict vegetarian who is over-indulgent in eating, induces the first variety of alimentary disturbance. He overtaxes and overburdens his digestive apparatus with such an excess of vegetable proteid as to cause severe flatulence, etc. The Bacillus ærogenes capsulatus and the Bacillus enteritidis sporogenes are rarely found in the feces in this variety of disturbance, but are present in large numbers in the indolic variety. [The ordinary feces consist largely of the unabsorbed chyle remnants, undigested food, and remnants of intestinal and hepatic excretion, all extensively permeated by a vast multitude of bacteria. It has been estimated that, when easily digested food has been taken, about one-third of the solids of the feces consists of bacteria.]

Great nutrition does not necessarily result from excessive ingestion of food. On the contrary, normal nutrition is apt to be lessened through the tax placed upon the digestive and other functions. Appropriation of food is dependent upon the character of the food, ease of conversion into absorbable material, and the perfection with which systemic distribution is made. Age, habits, heredity, rest, exercise and idiosyncrasy all play an important part in the determination of one's assimilative power, and the bodily condition as to fleshiness, etc. Overabundant ingestion of food results in an excessive production of uric acid or other harmful end-products. A toxic condition may result from a disturbance of the relationship between producton and elimination, as well as from overproducton or deficient elimination. Functional disturbances may in time become structural ones. Toxic matter may be thrown into

the circulation by a functional disturbance, injuriously affecting the parenchyma cells of organs distant from the seat of original disturbance, producing degenerative changes in such organs. There seems to be an affinity on the part of certain toxins for certain tissue cells.

In acute disorders of digestion, and in many other affections, nature endeavors to protect the body against the effects of injurious substances by developing a leucocytosis. Under certain conditions she also develops anti-bodies for protective purposes. To cooperate, we produce soluble toxins in such suitable media as broth, etc., from the organisms of tetanus, botulism, diphtheria, etc., and with them develop specific antidotes, which we call antitoxins, to counteract the effects of the organisms and their products.

In cases of decomposition effects apparently caused by the decomposing action of the intestinal juices on valueless proteins; also where, in intestinal lesion or general disease, a condition of so-called auto-intoxication results dependent upon putrefactive changes in the intestinal canal caused by bacterial action, it is important that the protein diet—such as eggs and meat—be reduced. By such reduction, less material is provided for protein decomposition or for the putrefactive organisms to live upon and produce their putrefactive products. [Strictly fresh eggs contain little or no toxin, but meat altho quite fresh, usually contains toxins; the less fresh, the more toxins, and heating does not destroy them.] Putrefactive bacillary processes occur chiefly in the colon, from which they may extend up into the small intestine and even into the stomach. Their effects are more toxic than mechanical in character, affecting chiefly the blood and nervous system. As previously indicated, carbohydrates should be eaten, in order that they may serve as food for acid-forming organisms and thereby diminish the putrefactive processes. Furthermore, the direct destruction of the putrefactive organisms may be attempted by means of direct intestinal disinfection, through the use of intestinal antiseptics. But if these are used in sufficient strength and quantity

to be effective, they are liable to disturb digestion and also to injure the mucous membrane; or they may be absorbed before they can act; or they may be rendered inactive by proteids in the intestinal canal.

The lactic acid bacillus, which is not a putrefactive organism, has the power to arrest putrefactive processes in the intestinal canal. This effect is claimed for both the Bulgaricus and the Hueppe varieties.

Prof. Elie Metchnikoff of the Institut Pasteur, Paris, carefully prepared cultures of the bacillus Bulgaricus, which cultures he named Lactobacilline. This preparation, in the form of either tablets, liquid, or powder, containing the live bacilli, he has recommended as a bacillary treatment of microbial and fermentative affections of the alimentary canal. The tablets may be swallowed, or one of the preparations may be employed to sour milk to be used for both protective and nutritive purposes. When the preparation is used, the bacilli in it multiply and act upon the carbohydrates they encounter, producing lactic acid. The lactic acid appears to have an antiseptic action in the alimentary canal, arresting the production of putrefactive organisms and their toxic products. When Lactobacilline is used to sour milk (preferably pasteurised milk) the bacilli multiply, lactic acid is produced by the action of the bacilli upon the milk sugar, and the casein is made very soluble. Klotz, Leon and many others recommend sour milk thus prepared. [The ordinary "souring of milk" produces a natural curdling, the curd consisting mainly of casein, the result of the precipitation of caseinogen, the chief proteid of milk.] There are several preparations on the market quite similar to Lactobacilline. The use of buttermilk in place of sour milk has also been recommended. Buttermilk tablets, called Lactone, pure cultures of the Hueppe lactic acid bacilli, are used to produce a variety of buttermilk said to retain all the food elements of fresh milk, etc. Lactic acid itself may be given for its corrective influence in cases of intestinal putrefaction instead of taking or using the Lactobacilline, etc.; but the acid is quite liable to cause gastric

and renal irritation and it is also probable that it will be decomposed before reaching the large intestine.

Acid intoxication, a form of auto-intoxication, results from loading the blood and tissues with such acids as lactic, sarcolactic, sulphuric, phosphoric, uric or fatty acids, due to proteid decomposition or imperfect oxidation. They manifest their presence by various nervous disturbances—sometimes mental dulness or coma—and particularly by a free elimination of their compounds in the urine. Bodily fatigue has been assumed to be caused by an analogous auto-intoxication.

The normal alkalinity of the blood is reduced in chloroform absorption, and in acute alcoholic intoxication through the production of volatile fatty acids, producing more or less marked systemic disturbance. Perhaps the benign effects resulting from the administration of ammonia in cases of acute alcoholic intoxication may be accounted for to some extent by an acid-neutralizing effect upon the blood.

It appears that at times or under certain conditions the stomach acts as an excreting organ in the effort to remove some special poison from the system. In various cases of hysterical and nervous crises, accompanied by severe headache and altered vision, the stomach contents were observed to be decidedly toxic. No poison had been taken and the toxic condition was not caused by food remnants or food decomposition. The stomach appears to have been acting as an excretory organ, removing toxic material from the circulatory system. Apparently, the mental state is of very great importance, from a toxicological standpoint..

An auto-intoxication dependent upon the production of putrefactive changes in the intestine, frequently causes great prostration, rapid emaciation, distressing pain in the head, disturbance of vision and various alarming nervous phenomena. The absorbed toxins may produce a degree of toxæmia seemingly imminently fatal in its effects. The treatment for the relief of an attack consists of a thorough cleansing of the alimentary canal, employment of heat, careful stimula-

tion, anodynes, etc. To prevent recurrent attacks there should be a thorough investigation of the patient's condition; an examination of the feces, and also of the urine to determine if the trouble is referable to the phenol, indol or skatol group. The comparative number of given bacteria found should be noted and serve as a guide in conducting the treatment. Careful dieting, sometimes the bacillary treatment, and colonic irrigation observance of the laws of hygiene, mental quietude, and gentle tonic treatment favor recovery.

Regarding the action of poisons in disease, as stated elsewhere, certain poisons are less active in certain diseases. On the other hand, the action of certain poisons is more severe in certain diseases.

The absorption of such poisonous substances as chloral, opium, digitalis, belladonna, etc., may be greatly interfered with in alcoholism. This results from the blood and tissues being heavily charged with alcohol. Hence in delirium tremens these substances may be given in more frequent and larger doses than in the normal state. However, death may result from the repeated administration of large doses of such agents as opium, chloral, etc., to intoxicated persons; the fatal result being due to the action of such poison after the elimination of the alcohol from the system. Salivation readily results when small doses of mercury are given in renal disease. Therefore, the effects of a poison are greatly dependent upon the condition of the system.

The general action of poisons, in the absence of or independent of disease, is very clearly and concisely stated by Kobert as follows:

> Some of the agents, such as the salts of the heavy metals, will readily combine with the protein substance, thereby causing their destruction, viz., necrosis of the tissues involved; others, such as concentrated acids and caustic alkalies, act also as powerful irritants and cause a reactive inflammation; still others, as strychnin, morphin, curare, muscarin, cause an excitation and enfeebling of the nerves, muscles, or glands of the affected parts, without any marked apparent changes.

The remote effect is produced by the absorption of the poison into the lymphatics and into the blood, causing general symptoms and diseases of other organs—e. g., of the kidneys, following the administration of cantharidin; of the brain, after taking opium; of the intestine, after quillaic acid. Practically, the remote action is really a local one produced by the poisoned blood circulating everywhere.

The poison, as it circulates in the blood, may be either decomposed, or it may enter into the combination with the blood constituents and thus change the composition of the blood, or it may reach the various organs in its original condition. Physiology teaches us that various endosmotic changes take place in these organs, depending upon their functions, upon the formation of their constituent elements, and upon the number and arrangement of the capillaries passing through them. The chemical constitution and physical properties of the poison will determine, to a varying degree, the rôle it plays in these changes by participating in the interaction of the vessels of the tissues. The presence of this foreign substance sooner or later disturbs, to a greater or less degree, the healthy condition and function of the organs particularly affected; and, again, this cannot take place without a reaction upon the whole body. The animal organism, however, possesses four means of rendering partly or entirely harmless poisons which have entered the system:

1. Rapid Elimination—Under this head, naturally, we first mention vomiting which, fortunately, occurs so promptly following the introduction of most poisons into the stomach that it generally saves the life of a patient, or at least has already materially lessened the danger to life before the physician puts in an appearance. We should call this vomiting, which takes place before the absorption of the poison, primary vomiting, in contradistinction to a secondary emesis, which takes place following absorption, and which latter is either exclusively a sign of disturbed cerebral activity or is caused by the excretion of the poison from the blood into the stomach. In an analogous manner we must differentiate between a primary diarrhœa, which carries off the poison before absorption, and a secondary purging, which is a sign of disturbed intestinal innervation, or is caused by the excretion of the poison from the blood into the lumen of the gut. Some poisons are not removed by vomiting or purging, but appear in the urine in a remarkably short time. Thus, for example, it is impossible to produce complete curarization by the administration of moderate, though oft-repeated, doses of curare, because the excretion of the poison through the kidneys takes place as rapidly as does absorption. The liver, pancreas, gastric mucous membrane (for morphin), intestinal mucous membrane (for mercury), salivary glands, mammary glands, and transformed into an increase of alkalescency, since even the lungs and other channels are effective in assisting the excre-

tion of various substances from the blood. Not nearly enough attention was formerly given to the excretion through the glands of the mucous membrane of the stomach. Finally, elimination takes place through the structure of the skin, especially through the sweat-glands.

2. The organism deposits and fixes poisons, in a manner not yet sufficiently understood, in several organs, especially in the liver, which certainly must be regarded as a filter for poisons, so far, at least, as enzymes (e.g., emulsin), metals (e.g., iron), metalloids (e.g., arsenic), and alkaloids (e.g., strychnin) are concerned. It is probable that, in the case of some substances, the biliary acids play an important part in the matter. We can hardly imagine that this disposition is accomplished in any other way than in the transformation of the readily soluble poisons into saline combinations, not freely soluble (bile-acid-alkaloids) or into albumen derivatives (metalbuminates). But, since these combinations are in no case entirely soluble, the beneficial action of the liver consists only in the fact that it gives the acute poisoning a more protracted, and consequently a milder, form.

3. The organism renders the poisons innocuous by phagocytosis. This destructive crusade carried on in the interests of the body by phagocytes, which has not yet been sufficiently inquired into pharmacologically, is applicable for certain toxalbumins (toxopeptone, enzymes), as well as for heavy metals.

4. The organism transforms the poison into a comparatively harmless, though readily soluble combination. Such a transformation may consist of neutralization, oxidation, reduction, coupling, splitting, and peculiar changing of the chemical constitution. (1) As an example of poisons rendered inert by neutralization, we must mention the acids, which are transformed, as far as possible, by the organism into the corresponding alkaline salts of less poisonous, or absolutely non-poisonous, properties. So far as the stomach is concerned, the organism attempts to balance any excess of alkali by the acids of the gastric juice and does the same thing in the blood by the decomposition of an immense number of blood-corpuscles, whereby glycero-phosphoric acid is formed from lecithin. Caustic lime is combined with carbamic acid and then excreted. (2) The best-known example of inertia produced by oxidation is that of phosphorus, which is transformed into phosphates. In an analogous manner the extremely poisonous sulphids are converted into sulphates which are relatively non-poisonous. The organic acids and their salts are oxidized to the ultimate degree, producing carbonates, and it is a prominent and important fact that in the latter case the dangerous diminution of the alkalescency by means of these acids is bicarbonates are of alkaline reaction. (3) Examples of producing inertia by means of reduction are offered in the case of iodates, chlorates and perchlorates, which are excreted in the

markedly less poisonous form of chlorids and iodids. (4) Inertia produced by coupling is one of the most remarkable facts in physiological chemistry. An intimate knowledge of this phenomenon is as imperative for the physician at the bedside as for the chemist intrusted with the chemical analysis of the remains. A poison can unite by coupling: (*a*) with sulphuric acid (e. g., phenol and cresol; (*b*) with glycuronic acid (e. g. camphor, borneol, menthol); (*c*) with glycocoll (e. g., benzoic acid, anisic acid, a part of salicylic acid). (5) Inertia produced by splitting occurs with tannic acid of nutgalls, and with some glucosids (e. g., salicin). (6) Examples of changes peculiar to themselves, as productive of inertia, are offered by the salts of ammonia, which are transformed into urea.

The liver is the most important organ in producing changes in poisons peculiar to themselves. Coupling occurs partly in the liver and partly in the kidney. Splitting processes take place mainly in the intestinal canal, although the liver must also be considered in this connection.

For a time it seemed that we were justified in supposing that organic substances could be divided into two well-defined classes, according to their respective actions exhibited within the animal body; the substances of the fatty series were supposed to be destroyed, while those of the aromatic series were not. To-day we know that this does not hold good for all substances; not even oxamid, belonging to the fatty series, a trace of which is oxidized; and tyrosin, a member of the aromatic series, which can be completely transformed into urea, carbon dioxid and water.

This observation, therefore, can at the present time be stated only in the following form: Organic substances containing annular linkage within the molecule are frequently not oxidized to form carbon dioxid, water, and urea. It is immaterial whether or not they belong to the aromatic series proper. Substances not containing annular linkage, which are oxidized with difficulty or not at all, are mainly certain amids.

One of the foremost tasks of scientific pharmacology is to explain the relation between the chemical structure of a substance and its pharmacological action. Unfortunately, it can only be said at present that uniform laws, which would be of great service to the physician, have not yet been discovered.

As regards irregularity in elementary function: It may encourage certain intestinal bacteria to produce an excess fermentation of sugars and starches, or an excessive breaking-down of proteids; such breaking-down and absorption of the products, result in the so-called intestinal intoxication. Strictly, this condition should not be called auto-intoxication, but the latter term limited to disease caused by some functional digestive disturbance.

PART V.

TABLE OF IDENTIFICATION TESTS FOR POISONS.

(AN EPITOME OF SOME OF THE PRINCIPAL TESTS)

ACID CARBOLIC (PHENOL).

Carbolic acid added either to albumin or collodion causes such to coagulate.

An aqueous solution of carbolic acid treated with one drop of ferric chloride solution gives a permanent violet blue color (the reaction may be interfered with by the presence in excess of hydrochloric or acetic acid or alcohol); the color produced by creosote with ferric chloride solution is at first violet blue, but changes rapidly to greenish and brown, with formation usually of a brown precipitate.

With bromine water, carbolic acid forms a white flocculent precipitate of tribrom-phenol. Under the microscope it appears as acicular crystals.

Carbolic acid mixed with ammonia water and a little chlorinated soda solution, and warmed, develops a blue color. To a few drops of carbolic acid solution on a white porcelain surface add three or four drops of a solution of one part of molybdic acid in ten or fifteen parts of concentrated sulphuric acid; a yellowish-brown coloration results, which is soon followed by a beautiful purple color.

When carbolic acid is in the urine, it is in combination with the sulphates, so that neither the sulphuric nor the phenol radical will respond to the usual tests; but the natural quantities of sulphates again appear if the urine be boiled with hydrochloric acid. The preceding tests may then be employed.

In making post-mortem investigations, the odor of

carbolic acid is, as a rule, observable upon opening the body. The stomach contents are to be acidified and distilled, and the various tests applied to the distillate.

ACID HYDROCHLORIC.

Hint.—All acids turn blue litmus red.

If a glass rod be dipped in ammonia water and then held over hydrochloric acid, dense white fumes are produced.

Hydrochloric acid, even in diluted solutions, treated with silver nitrate, gives a curdy white precipitate which is dissolved upon adding ammonia water, and reprecipitated by nitric acid.

ACID HYDROCYANIC.

A characteristic test is its odor: it has the odor of bitter almonds or peach kernels.

A glass rod moistened with silver nitrate becomes milky in the vapor of hydrocyanic acid.

By silver nitrate, the acid is precipitated as silver cyanide, a white, curdy precipitate, not soluble in cold or weak nitric acid, but entirely soluble in boiling concentrated nitric acid.

To the suspected liquid add a little solution of potash and then a mixture of ferrous and ferric sulphates; a dirty greenish-blue precipitate results, which, should hydrocyanic acid be present, becomes clear Prussian blue on acidifying with pure hydrochloric acid.

Liebig's test (characteristic in the absence of meconic acid):—

Treat a solution of hydrocyanic acid with ammonium sulphide, and gently heat; a white sulphocyanide of ammonium is produced; by touching this with a drop of persulphate or perchloride of iron, a blood-red sulphocyanate of iron results.

Make suspected fluid slightly alkaline with potash; add cupric sulphate solution and a greenish-white pre-

cipitate will be obtained; add a few drops of hydrochloric acid, and it turns white.

If, in post-mortem investigations, the jar in which the liver, brain, stomach and contents, and other organs, is received, is gently warmed, and a glass rod or watch glass moistened with silver nitrate solution held over its mouth, the vapor which rises from the contents of the jar will, if hydrocyanic acid is present, form white, crystalline silver cyanid, on the rod or watch glass. This may be proved to be silver cyanid and not silver chlorid by its turning blue, upon adding hydrochloric acid and a mixture of ferrous and ferric sulphate. Extended chemical analysis is carried out as indicated in Part V of this book.

As a rule, hydrocyanic acid may be found in the body for about three weeks after death. But in case of body decomposition the sulphuretted hydrogen generated may convert the acid into the thiocyanate. In such case the thiocyanate should be dissolved out by alcohol, and this followed by filtration and evaporation. The residue should then be dissolved in water and tested by a ferric salt. Thiocyanate has been found in the body as long a time after death as four months. The fact that thiocyanates are found in the saliva and the latter may have been mixed with the material under investigation, should not be overlooked.

ACID NITRIC.

Concentrated nitric acid is known by its orange colored, irritating fumes. Poured on copper filings it effervesces, gives off red acrid vapor and, a blue liquid remains.

Nitric acid mixed with hydrochloric acid dissolves gold. A trace of nitric acid with sulphuric acid gives a blood-red color with narcotine. The strong acid gives a deep red color with brucine.

Nitric acid stains all albuminoid substances yellow; gives a yellow stain on skin or piece of quill; reddens morphine and its salts; blackens green iron sulphate in the presence of sulphuric acid.

ACID OXALIC.

The crystals are oblique, flattened, octahedral prisms, colorless, odorless, permanent in the air, and very acid; thus distinguished from crystals of magnesium sulphate, and zinc sulphate. When the crystals are heated they melt, dissipate without charring and leave no residue.

Cupric sulphate added to solution of oxalic acid gives a light-blue precipitate of cupric oxalate not redissolved by a few drops of hydrochloric acid.

Adding lime water forms calcium oxalate, which is insoluble in excess of lime water but soluble in nitric acid or hydrochloric acid, but not in any vegetable acid.

To a solution of oxalic acid add silver nitrate and a white precipitate of oxalate of silver is produced, soluble in nitric acid; when dried and heated on platinum foil it detonates and evolves a white vapor.

In post-mortem analyses, acidify the material to be tested (kidneys, stomach and contents, etc.) with hydrochloric acid and digest the whole for several hours with dilute alcohol, stirring frequently. After filtration ammonium hydroxid should be added to the filtrate until the latter is alkaline; acetic acid should then be added until a slight excess results; then add calcium chlorid; after thorough stirring stand the mixture aside. If a precipitate results, it is from the combination of oxalic acid with calcium. Under the microscope the characteristic octahedral crystals may be identified. The salt turns gray upon being heated. Dissolve some of the precipitate in water, acidify with dilute sulphuric acid; upon adding a few drops of potassium permanganate solution, decolorization of the permanganate occurs.

ACID SULPHURIC.

The acid looks oily and is heavy. It feels soapy in the fingers. Concentrated sulphuric acid is usually white, or if impure, a brownish colored liquid, and chars wood or other organic matter.

Upon mixing it with water, heat is evolved. It forms sulphurous acid gas when boiled with mercury.

Add a small portion of veratrine to some of the diluted acid, carefully evaporate to dryness, and a crimson-purple color is obtained. Sulphuric acid gives a white precipitate with barium chloride.

ALKALIES (SOLUTIONS OF AMMONIA, POTASSA, SODA).

The alkalies turn red litmus blue.

They feel soapy in the fingers.

They are not precipitated by adding solution of potassium carbonate as the solution of alkaline earths are. They neutralize acids, and saponify fats.

The presence of one of the caustic alkalies, in vomited matters or stomach contents, may be suspected, when in addition to alkaline reaction and soapy feeling in the fingers, the suspected materials become frothy when shaken, and produce but slight effervescence upon adding an acid. Potash, or soda, would be indicated if, when the suspected materials are warmed, ammoniacal odor is absent, and the holding over them of a glass rod, dipped in hydrochloric acid, produces no cloudy effect upon the surface of the rod. If some of the suspected material be filtered, the filtrate evaporated to dryness, then heated to a dull red heat until all organic matter is destroyed, and then cooled, upon adding a small quantity of dilute hydrochloric acid a solution is obtained with which to determine whether the alkali is potash or soda. Upon testing this solution with a platinum wire held in the colorless flame of a Bunsen burner, a lavender color imparted to the flame indicates potassium, a yellow one sodium.

ALKALOIDS.

Wormley's test directs to treat the suspected substance, in solution, with an alcoholic solution of picric acid, and if alkaloids are present a yellow precipitate will be obtained.

Mayer's reagent gives a white precipitate with alkaloids.

Wagner's reagent gives with alkaloids a brown precipitate soluble in alcohol.

A powder of either brucine, delphine, morphine, impure strychnine, or physostigmine with nitric acid, gives a red color; if by adding stannic chloride it becomes violet, it is brucine; if it becomes black, it is delphine; if it is soluble, giving off free iodine when iodic acid is added, it is morphine; if not soluble and will not decompose iodic acid, it is strychnine; if the powder became green when nitric acid was added, it is solanine; if the powder is insoluble in ether and does not redden nitric acid, it is emetine; if it is soluble in ether, does not redden nitric acid, and is volatilized, it is atropine; if it is soluble in ether, does not redden nitric acid, and is not volatilized, it is veratrine.

ACONITINE, COCAINE, CONIINE, DATURINE, NICOTINE, ETC., AND GLUCOSIDE SOLANIN.

Aconitine.

Pure Aconitine crystals are colorless and transparent. If a solution of aconitine be applied to the skin it produces a sensation of heat and numbness. It is said that so small a quantity as one one-hundredth part of a grain, dissolved in spirit and rubbed into the skin, will cause a loss of feeling which will continue for quite a while. For toxicological analysis a modification of Stas' process is employed. (See text-books).

Stas' Method.—In this method the organic matters are extracted by strong alcohol, tartaric acid being added. Then the filtered solution is carefully neutralized with soda, shaken up with ether, and a pipette used to separate the ethereal solution. Some analysts have recommended that chloroform be used in place of the ether, and that amyl alcohol also be used; also that acetic, hydrochloric, and sulphuric be substituted for tartaric acid. Otto proposed a modification of Stas' method, and such modification

is considered by very many chemists to be a decided improvement over the original method of Stas. Dragendorff's method is quite frequently employed in the isolation and identification of alkaloids. (See books on organic analysis).

Cocaine.

In aqueous solution, cocaine is best identified by means of the crystalline precipitates which platinum chloride, gold chloride and picric acid produce. In very dilute solution iodine in potassium iodide produces a rose-colored precipitate; and a non-crystalline brown one in stronger solutions.

If a small portion of cocaine is covered with fuming nitric acid and dried on a water bath, then when cold, moistened with a drop of solution of potassium hydroxid in absolute alchohol, a distinct odor of citronella or peppermint may be observed.

Coniine.

The leaves of parsley may readily be mistaken for those of conium. In suspected poisoning by conium, the contents of stomach and intestines should be carefully examined for the remains of hemlock seeds or leaves. Suspicious leaves should be carefully rubbed up in a mortar with potassa to bring out the peculiarly mousy smell of conium leaves.

Employ Stas' process in analysis.

Coniine is found chiefly in the conium seeds, and is exceedingly powerful and fatal.

If a drop of coniine is put in a watch-glass, over which another watch glass be placed, on the under surface of which has been put a drop of pure hydrochloric acid, dense, white fumes will quickly fill the enclosed space, and the coniine be changed into a quantity of beautiful, delicate, crystalline needles. These do not deliquesce upon exposure to air.

Daturine.

Stramonium seeds are kidney shaped, wrinkled, black or brown in color, and larger than the seeds of

belladonna or hyoscyamus. Daturine may be detected in the stomach and other organs by the same analytical processes as employed for Atropine.

Nicotine.

Upon adding a solution of iodine in ether to an ethereal solution of nicotine, after some time long needle-like crystals form.

Platinum chloride causes a yellow precipitate to form which is soluble in hydrochloric acid, and appears crystalline under the microscope.

Picric acid produces a yellow, amorphous precipitate, which under the microscope appears as a crystalline tuft. For organic analysis Stas' process is advantageously employed.

The Glucoside Solanin.

In the pure state solanin appears as delicate, acicular crystals, soluble in ethyl and amyl alcohol, slightly soluble in ether, almost insoluble in water and altogether insoluble in chloroform. A hot amylic alcohol solution of solanin gelatinizes upon cooling, even though but little solanin be present.

Sulphuric acid turns solanin to an orange-yellow color, after which it dissolves it and such solution turns brown.

When solanin is present in an organic mixture a modification of Stas' process is employed for its determination.

ANESTHETICS.

Chloroform and Chloral.

Such organic mixtures as the contents of the stomach usually retain the odor of chloroform for some time. After distilling such mixtures on a water bath, the distillate should be redistilled with calcium chlorid, and then the proper tests for odor, solubility, etc., applied. When heated with an alcoholic solution of caustic potash and a few drops of anilin, chloroform gives off an unpleasant odor, similar to that of witch hazel. After chloroform has been

extracted from the stomach by distillation, it may be tested by passing the vapor through a flame, whereby decomposition into carbon, chlorine, and hydrochloric acid will occur. The carbon is easily recognized by its black deposit; the hydrochloric acid by its turning blue litums red; the chlorine by its effect upon starch paper which has been dipped in a solution of potassium iodide, the iodine being set free by the decomposition of the potassium iodide, the starch turns blue.

Chloral.—In testing for chloral, the chloral should be converted into chloroform by mixing with an alkali.

After the solid matters have been properly divided they should be diluted with distilled water, sodium hydroxid added to alkalinity, then after heating in a flask, conduct the remainder of the examination as in chloroform analysis.

ANTIMONY.

Tartar emetic is the principal medicinal salt of antimony.

Tartar emetic is soluble in water, but not in alcohol. If a portion of tartar emetic is heated to redness, it chars, emits an odor of burning sugar, and leaves a black residue, having an alkaline reaction. If this is mixed with charcoal and heated in a small glass tube, a dark mirror-like ring of metallic antimony will form in the cooler portion of the tube.

A solution of tartar emetic treated with tincture of nutgall or solution of tannic acid gives a whitish-yellow precipitate of tannate of antimony.

Sulphuretted hydrogen gives an orange colored precipitate with antimony solution.

(See also Marsh's and Reinsch's Tests, described under arsenic.)

ANTIPYRINE.

Antipyrine gives a red color with ferric chloride; the color disappears upon adding a few drops of sulphuric acid.

Antipyrine gives a green color with nitric acid. To a solution add 12 drops of sulphuric acid, 2.5 grammes of sodium metaphosphate, filter and add a few drops of solution of sodium nitrate, and a green color is obtained.

ARSENIC.

Gives garlic-like odor when sublimed on charcoal or red-hot iron. When heated in glass tube it sublimes, forming small octahedral crystals on the sides of the tube. Sulphuretted hydrogen gives a yellow precipitate with arsenic. Ammoniated solution of cupric sulphate gives a green precipitate.

Marsh's Test: Introduce some pieces of zinc, free from arsenic and antimony, into a bottle holding about 150 c.c.; then pour over them sulphuric acid, diluted with 4 parts of distilled water; close the flask with a cork containing a funnel tube, which reaches nearly to the bottom of the bottle and a delivery tube, drawn to a fine point, into which a bulb containing a pledget of cotton has been introduced. After allowing the generation of hydrogen to go on for about half an hour, to expel the air from the upper part of the flask, light the gas at the open end of the delivery tube and hold a cold porcelain surface down upon the flame. If the zinc and sulphuric acid used contain no arsenic or antimony, no black stain will be produced on the porcelain. It thus being evident that the apparatus and materials are free from arsenic, put out the flame and pour the suspected fluid through the funnel tube so as to admit little or no air with it into the flask. Then ignite the gas and test the flame again with the cold porcelain surface. If a brilliant black or brown stain, soluble in a solution of chlorinated soda is obtained it is probably arsenic. If you moisten one of these spots with nitric acid it should disappear, then evaporate the acid over a lamp, moisten the spot with water, and hold the dish over a vessel containing sulphuretted hydrogen, prepared by the action of sulphuric or hydrochloric acid upon sodium or potassium sulphide.

If the stain was due to arsenic, the spot will turn lemon-yellow. The antimony mirror is insoluble in chlorinated soda (Labarraque's Solution), and after treatment as above, gives an orange stain. Now soften the glass, bend the delivery tube downward, and let it dip into a solution of silver nitrate; after an hour pour some very weak solution of ammonium hydroxide upon the surface of the silver nitrate solution. A yellow precipitate at the line of separation of the two liquids shows the presence of arsenic. If the substance to be tested is a solid, a small portion of it may be thrown upon glowing charcoal, when if arsenic be present, it will give a garlic-like odor.

[Various modifications of Marsh's test have been proposed by different writers; one, in which, instead of the use of porcelain, the arsenic is deposited in a drawn-out narrow tube, as advised by Otto and others.]

Reinsch's Test may also be employed as follows:

Boil the liquid suspected of containing arsenic, with one-sixth of its bulk of pure hydrochloric acid. Then, or before boiling, introduce a bright slip of copper when, if arsenic be present, it will coat the copper with an iron-gray deposit. Remove the copper, wash it with distilled water and dry it between folds of blotting paper. Then cut it into slips, introduce it into a reduction tube and apply heat, when, if arsenic be present, arsenous acid will be sublimed and deposited on the sides of the tube in minute octahedral crystals. These may be dissolved in water and tested by the various reagents.

Antimony deposits nearer the copper than arsenic does, and it produces a blue or violet tinted deposit on the copper foil. The interference encountered by the presence of organic matter in the suspected mixture may be overcome by separating the arsenic by dialysis.

The copper and hydrochloric acid used in the above process should have been previously tested as to purity by boiling the copper with a mixture of the acid and distilled water.

When arsenic is supposed to be present in organic matters, a distillation process may advantageously be resorted to as follows: Dry the suspected matters on a water bath, not using too great heat. Then introduce them into a flask fitted with a long bent tube; add a quantity of strong hydrochloric acid (previously proved free from arsenic), sufficient to drench the material. Digest the whole for several hours. Then apply heat to the flask by means of a sand-bath and a receiver, containing a little water, fitted to the bent tube. Both receiver and tube should be kept cool. By this distillation process arsenic passes over in the form of arsenous chloride and is collected in the receiver. An additional portion of hydrochloric acid may be used to remove any traces of arsenic in the organic material. The arsenic may be obtained from the chloride by boiling with pure polished copper, as described above in Reinsch's process.

BARIUM SALTS.

A few drops of sulphuric acid dropped in the suspected fluid gives a white precipitate, insoluble in nitric acid.

[If the barium is in a colored menstrum, it should be bleached with chlorine; then drive off the chlorine by heat before applying the test.]

Burnt on platinum wire barium salts give a greenish flame.

BELLADONNA AND ATROPINE.

Treat the suspected substance with a few drops of concentrated sulphuric acid and warm. If atropine be present an odor resembling a mixture of roses and orange flowers develops; on now gradually adding a few minute fragments of potassium dichromate, the odor will change to that of bitter almonds; the color will be green.

Atropine dilates the pupils when a drop of a very weak solution is introduced into the eye.

In suspected poisoning by Belladonna, the vomit

stools and stomach contents should be thoroughly examined for seeds, berries, or the remains of leaves or root.

The stomach and its contents should be thoroughly comminuted, then acidified with warm alcohol and acetic acid. The mixture should then be filtered and the filtrate treated with sulphuretted hydrogen and lead subacetate, thus precipitating lead sulphide. The clear filtrate should then be evaporated to dryness, acidified, saturated with solution of potash in excess, and after the addition of alcohol suitable identification tests may be applied to the extract.

BRUCINE.

Nitric acid dissolves it and colors it blood-red. By then adding solution of protochloride of tin, color changes to deep violet.

CANTHARIDES.

If the cantharides be undissolved, there are shining green pieces of the drug.

Water gives a white precipitate when added to the alcoholic solution, the precipitate being afterwards soluble in an excess of water.

By exhausting the suspected material with ether, cantharidin may be separated out of it. The ethereal solution may then be evaporated until nearly dry, and spread on oiled silk. If upon applying it to the skin, it blisters, cantharidin is present.

CARBONIC ACID GAS.

When the gas is present in the proportion of 12 to 15 per cent. it extinguishes a candle.

Agitating solution of lime or solution of subacetate of lead in this gas produces a white precipitate in the solution.

Agitating a litmus-blued solution of chloride of lime in the gas drives off the color, which is evidence that it is not nitrogen.

COPPER SALTS.

Whether in solution or not, all cupric salts are blue and green. The reaction of the solution is usually acid.

To a suspected solution add solution of ammonia, a bluish-white precipitate is produced, soluble in excess of the ammonia, producing a violet-blue solution when copper is present.

Potassium ferrocyanate gives a chocolate-brown precipitate or reddish-brown color, if copper is present, although only in small quantities.

Sulphuretted hydrogen gives a deep brownish-black precipitate when added to a solution of a copper salt.

If polished steel is suspended in a copper solution, it speedily becomes coated with copper.

Pour the suspected solution on a platinum plate, acidulate with nitric acid, then touch the platinum passing through the solution, with a slip of zinc, and if copper is present, it will deposit upon the platinum.

In examining such organs as the kidneys, liver, etc., for the presence of copper, the organ or organs under examination should be incinerated, the resulting ash treated with dilute hydrochloric or sulphuric acid and the various tests for copper applied. In examining vomited matter or stomach contents, they should be diluted, if necessary, stirred and allowed to stand in a conical vessel for several hours. To the clear fluid which separates the various tests for copper may be applied as above given.

CREOSOTE.

Creosote has a peculiar smoky odor, and instantly coagulates albumen.

With Ferric Chloride creosote gives a violet colored solution, rapidly changing to green, then brown and forming a brown precipitate. Phenol gives a purple colored solution.

Creosote is not soluble in glycerine; phenol is, Creosote does not coagulate collodion; phenol does.

FORMALDEHYDE.

Dissolve a decigram of morphine in 1 c.c. of sulphuric acid; gently add, without mixing, an equal volume of the suspected liquid; if there be any formaldehyde present the liquid will soon assume a red violet color.

ILLUMINATING GAS.

Blood charged with illuminating gas does not coagulate. When shaken a distinct froth forms.

The blood is of a bright cherry color, which is persistent.

If to the blood which has taken up illuminating gas a 5 per cent. solution of caustic soda be added, the bright red color of the blood will be maintained or intensified; whereas in normal blood the color will change from red to green and later a dark brown.

Hemoglobin in combination with carbon monoxide is not changed by adding reducing agents. The oxyhemoglobin of ordinary blood is changed. Both kinds of blood show two absorption bands when examined through the spectroscope, but they vary slightly in position. Upon adding a reducing agent to ordinary blood, the two bands disappear and a broad band of reduced hemoglobin appears in their place. This does not occur with the blood which is saturated with the gas if more than 27 per cent. of the hemoglobin be saturated with carbon monoxide.

Rubner's test for carbon monoxide in blood, is: Shake the blood with 4 or 5 volumes of lead acetate in solution; if the blood contains carbon monoxide, it will retain its bright color; if not, it becomes a chocolate-brown.

IODINE.

Free iodine turns gelatinized starch blue.

Acetate of lead gives a yellow precipitate of lead iodide. By sublimation a violet or purple vapor is produced.

To a solution of an iodide add nitrate of silver solution, a pale yellow precipitate results, insoluble in nitric acid or ammonia water.

Potassic iodide gives a scarlet precipitate with a solution of bichloride of mercury.

Iodides mixed with starchy solutions and treated with chlorine gas or nitrous acid give a blue color.

When iodine is combined as in the form of an iodide or iodoform, it must be set free in order to test it. The urine or stomach contents suspected to contain such should first be digested with distilled water, then filtered. If upon adding first some chlorine water and then a few drops of starch paste to a little of this filtrate, a blue color is obtained, the presence of iodine in the above combined form, in the original solution, is indicated. Free iodine would be indicated by a blue color obtained in the same way, but omitting the chlorine water.

LEAD.

Solution of potassic sulphate will give a white precipitate. Sulphuretted hydrogen gives a black precipitate. Potassic chromate produces a yellow precipitate. Dissolve in acetic acid, add potassic iodide, which gives a yellow plumbic iodide precipitate.

MERCURY SALTS.

Salts of mercury are either mercuric or mercurous.

The most important salt of mercury, from a toxicological standpoint, is corrosive sublimate (mercuric chloride). This and other *mercuric salts* are identified by the following tests:

With potassium iodide solution, a scarlet precipitate is formed, which dissolves upon adding excess of the potassium iodide solution.

With solutions of soda or potash, a yellow precipitate is formed.

Heated with sodium carbonate in a tube, globules of metallic mercury are formed.

Upon a bright gold surface drop some of a solution of the suspected poison, when, if corrosive sublimate be present, it will form an amalgam when the gold surface is touched by the point of a knife through the fluid.

Mercurous salts, such as mercurous nitrate, calomel, etc., are identified by giving a black precipitate with alkaline hydroxides, a greenish-yellow precipitate with potassium iodide.

If a solution of stannous chloride be added to a suspected mercury salt solution, a white and gray precipitate consisting of metallic mercury and calomel is produced.

In the examination of suspected urine it should be evaporated to dryness by gentle heat on a water bath. The residue should then be dissolved in distilled water with a few drops of hydrochloric acid boiled and filtered, when the various tests for mercury salts may be employed.

NITROBENZOL.

When nitrobenzol is mixed with organic matter, it may be separated by distillation, after having added sulphuric acid.

NUX VOMICA AND STRYCHNINE.

Adding nitric acid to an aqueous infusion of nux vomica gives a bright red color.

Adding ferric chloride to aqueous infusion of nux vomica gives a green color.

No change occurs upon dissolving strychnine in sulphuric acid; however, if we add an oxidizing agent, such as potassium bichromate, manganese dioxide, lead peroxide, etc., a play of colors from deep blue to purple, violet, rapidly changing to red or crimson, and orange-yellow, results. Quebrachine is the only alkaloid substance which produces the same colors in the same order, but it differs from those of strychnine in the intensity and duration of the color play; and que-

brachine dissipates on heating on a water-bath, strychnine does not.

After being absorbed, strychnine is deposited in the various organs like mineral poisons. It is usually found in the liver and kidneys, but has been discovered in the blood, spleen, brain, heart, etc. To detect it, it is necessary to finely subdivide the suspected tissues and digest them in alcohol acidulated with sulphuric acid. The mixture is then cooled, filtered and concentrated, the residue washed with acidulated alcohol, and evaporated. Chloroform is then employed the same way, and after evaporation the residue is purified and suitable identification tests applied.

OPIUM AND MORPHINE.

Ferric chloride gives a deep red color with an aqueous solution of opium.

Also apply tests for morphine.

In making a toxicological examination for the detection of opium in the stomach, vomit or tissues, the stomach contents should first be examined for particles of undissolved opium, and an effort made to discover the odor of opium or one of its preparations.

In examining vomited matter, or the stomach contents, such should be finely divided, if in a solid state, distilled water added until a thin paste is secured, the mixture acidulated with tartaric or acetic acid, and then digested over a water-bath for about an hour. It should then be filtered and the filtrate evaporated. Two or three volumes of 95 per cent. alcohol should then be added to precipitate the organic matter and the mixture should be well stirred. The insoluble material should then be separated by filtration, and the filtrate evaporated, thus removing the alcohol. The residue should then be dissolved in water acidulated with tartaric or acetic acid, to still further separate extraneous organic matter, after which it should again be filtered. A slight excess of lead acetate should now be added to the filtrate until there is no further precipitation. The

precipitate produced is insoluble lead meconate and contains the meconic acid, if such were present in the materials under examination. After allowing the precipitate to stand, it should be placed on a filter and washed with distilled water. The substance on the filter should now be analyzed for meconic acid; the filtrate should be analyzed for morphine, it being present in that solution as an acetate.

Process A. Separation of the meconic acid:

Slightly wash the material on the filter with distilled water, to dissolve out any soluble portions. Then wash the precipitate from the filter into a beaker; after which pass sulphuretted hydrogen through the contents of the beaker, thus precipitating the black insoluble lead sulphide, leaving the meconic acid in solution. Then filter the mixture to remove the lead sulphide. The filtrate contains the meconic acid and should be concentrated by evaporation, after which it may be tested by adding a little ferric chloride to a portion of it to determine the presence of meconic acid. With ferric chloride, a red color would be produced, which would not be destroyed by strong mineral acids. If another portion of the filtrate be taken and concentrated by evaporation, the meconic acid may crystallize out if present in sufficient quantity.

Process B. Separation of the morphine:

The filtered liquid which contains the morphine acetate together with the lead acetate in excess, should be taken and treated with sulphuretted hydrogen, by passing the latter through it to saturation, thus removing the excess of lead acetate, the lead being converted into the insoluble sulphide. In order that the sulphide may settle, the mixture should be allowed to stand in a warm place for a number of hours. The sulphide may then be separated by filtration. It may then be evaporated by a gentle heat, placed in a test tube, a slight excess of ammonia added, then a double volume of amyl alcohol, the mixture thoroughly shaken and allowed to stand. In a short time the amyl alcohol will rise to the top of the tube and may be removed by

using a pipette. Then another portion of amyl alcohol is used to repeat the operation, the two portions mixed, and a gentle heat employed to evaporate this mixture. A microscope should then be used to examine the residue for morphine.

Before applying the characteristic tests for morphine, all impurities and foreign matter should be separated from the residue; this is done by dissolving the residue in a little dilute acetic acid and then filtering the mixture. The morphine may then be left unaffected and all impurities taken up, by making the remaining fluid alkaline with potassium carbonate, and shaking the mixture with hot amyl alcohol added in double volume. The various tests for morphine may then be applied.

Regarding the detection of morphine in the organs and tissues, the organ to be examined should be finely subdivided and subjected to the same course of procedure as detailed above for the examination of vomited matter or stomach contents.

To powder supposed to be morphine, or to strong cold solution supposed to contain morphine, add strong nitric acid in excess and an orange-red color will be produced, which slowly fades to yellow and is not changed to purple upon adding stannous chloride, as occurs with brucine.

Solution of ferric chloride neutralized by potash gives an inky-blue color when applied to a cold and not very acid solution. (As phenol, gallic acid, tannic and salicylic acids give a similar color, care should be taken to insure their absence.)

Iodic acid mixed with starch produces a purplish or deep purple color when added to a cold and not very acid solution.

(Husemann's Delicate Morphine Test):

Heat the suspected liquid to 150° F. for a few minutes with concentrated sulphuric acid; let it cool and add a trace of potassium chlorate or chlorine water; a blue to violet-red color, changing to blood-red and finally disappearing, is produced.

PHOSPHORUS.

Mitscherlich's process is usually employed for detecting phosphorus.

The organic matters supposed to contain phosphorus are made fluid by diluting them with distilled water, and then acidified with sulphuric acid. They are then placed in a flask and put upon a sand-bath and the flask connected with a Liebig's condenser and placed in absolute darkness. When the flask is heated, the phosporus present is volatilized, and upon its condensing in the tube a luminous ring is formed, which is evidence of the presence of phosphorus. If alcohol, ether or oil of turpentine are present the luminosity of the phosphorus will be destroyed. Hence this process would in such case be useless.

SILVER NITRATE.

An aqueous solution of silver nitrate gives with hydrochloric acid a white precipitate of silver chloride, soluble in ammonia.

All the chlorides precipitate a solution of silver nitrate in the form of a white powder, which blackens by light.

Potassium chromate gives a dull red precipitate, soluble in acids.

TIN.

Tin compounds give a white precipitate, becoming gray and black, with mercuric chloride. They give a dark-brown precipitate with H_2S, soluble in alkaline sulphides, in potassium hydroxide, and also in hot water. They also give a white precipitate, with ammonium hydroxide, which turns olive-brown when the fluid is boiled.

TYROTOXICON.

Tyrotoxicon forms crystals with potassium hydrate.

When treated with a mixture of carbolic and sulphuric acids, a green color is produced.

In whey, tyrotoxicon varies in color from yellow to orange-red.

ZINC.

Zinc Sulphate :

Potassic chromate precipitates yellow zinc chromate.

Ammonium sulphide in the presence of ammonium hydroxide gives a white precipitate.

Potassium ferrocyanide gives a gelatinous white precipitate.

CRYSTALS.

(Under the Microscope.)

Strychnine (Alc. sol.).

Morphine (Alc. sol.).

Atropine (+KHO)

Oxalic Acid (Alc sol.).

Carbolic Acid, from dilute and conc. solutions. (From analysis of organs, etc., in a case of fatal poisoning by Carbolic Acid.)

This and the following chart, by Thompson of England, are worthy of the analyst's consideration:

"A CONDENSED CHART FOR THE DETECTION OF METALS IN SOLUTION."

Group I.	Group II.	Group III.	Group IV.	Group V
Add HCL White ppt. { Lead. Mercurous Salt. Silver. Bismuth or Antimony as oxychlorates.	Pass H_2S into solution. Black ppt. { Mercuric Salt. Copper. Bismuth. Lead.	Add AmCL, AmHO (till it smells when shaken). AmHS (a little). Black ppt. { Iron. Cobalt. Nickel.	Add to last solution Am_2CO_3. White ppt. { Barium. Strontium. Calcium.	Add to original solution Na_2HPO_4. White ppt. = Magnesium.
Add excess HCL ppt. dissolves if { Bismuth or Antimony.	Add Sol. Pot. Iodid. to same. If it turns Red = Mercury. Green = Bismuth. Yellow = Lead. Brown = Copper.	To original solution add $K_6Fe_2Cy_{12}$. Blue ppt. = Iron. Plum color ppt. = Cobalt.	Dissolve the ppt. in Acetic Acid and add K_2CrO_4. Yellow ppt. = Barium. If *no ppt.* add H_2SO_4. Dilute =	If no ppt. is obtained in either group, Potassium, Sodium or Ammonia are indicated. *Potassium.* Yellow ppt. with $PtCl_4$.
If precipitate does not dissolve, *boil*; if dissolved, Lead is indicated. If unchanged add ammonia.	Yellow ppt. with H_2S. { Arsenic. Cadmium. Stannic Salt.	Yellowish ppt. or none = Nickel.	White ppt. on standing or shaking = Strontium.	White ppt. with strong solution of Acid. Tart.
Precipitate dissolves = *Silver.*	Add to same Ammon. Sulphyd. Arsenic = dissolves. Tin = dissolves. Cadmium = insoluble.	White { Alum. Zinc.	*No ppt.* add $Am_2C_2O_4$.	*Sodium.* No ppt. with above and yellow flame.
Turns *black* = Mercury.	If ppt. is dissolved add HCL. Arsenic is precipitated, Tin is not.	To original solution add K_4FeCy_6. White ppt. = Zinc. No ppt. = Alum.	White ppt. = Calcium.	*Ammonia.* Heat with KHO, gas evolved. (Nessler's test.)
	Brown ppt. with H_2S = Stannous Salt.	Green ppt. = Chromium. The AmHS and Am HO must give a green ppt. for Cr. If white with Am HO, Al or Fe is indicated.		
	Orange ppt. with H_2S = Antimony.	Flesh color ppt. = Manganese.		

"CHART FOR THE DETECTION OF ACIDULOUS RADICALS OF SALTS IN SOLUTION," (THOMPSON.)

DISSOLVE THE SALT IN WATER, AND RENDER IT NEUTRAL, IF NECESSARY.

Group I. H_2SO_4. Decomposes.	Group II. $BaCl_2$. Precipitates.	Group III. $CaCl_2$ Precipitates.	Group IV. $AgNO_3$. Precipitates.	Group V. Fe_2Cl_6. Precipitates.	Group VI. $H_2SO_4+FeSO_4$. Forms a black colouration.
Sulphites.	Oxalates, *White.*	Oxalates, *White.*	Chlorides, *White.*	Ferrocyanides, *Blue.*	Nitrates.
Sulphides.	Tartrates "	Tartrates "	Tartrates "		
Carbonates.	Citrates "	Citrates "	Bromides, *Yellowish White.*		
Cyanides.	Sulphates "	Phosphates "	Iodides, *Yellow.*	Borates, *Yellowish.*	
Acetates.	Phosphates "		Phosphates "		
			Chromates, *Red.*		
			Arseniates, *Chocolates.*		
			Arsenites, *Yellow.*		

Group I. H_2SO_4 { Apply heat, and notice any odour which may be evolved.
Sulphides give off H_2S (sulphuretted hydrogen). Confirm.
Sulphites give off SO_2 (sulphurous acid gas). Confirm.
Carbonates effervesce and give off CO_2 (carbonic acid gas). Confirm.
Cyanides give off the odour of HCy (hydrocyanic acid). Confirm.
Acetates give off the odour of acetic acid. Confirm.

Group II. $BaCl_2$ { Should the precipitates produced by this reagent be insoluble in HNO_3, a sulphate is indicated.
Should the precipitate be soluble, pass on to Group III.

Group III. $CaCl_2$ { Should the precipitate produced by this reagent be insoluble in acetic acid, but soluble in HCl, the presence of an oxalate is indicated. Confirm. Tartrate of calcium is also insoluble in acetic acid, an acid tartrate of calcium being formed, which may be distinguished from the amorphous oxalate of calcium by its crystalline character. Confirm. Should the precipitate be soluble in acetic acid, test for citrates.

Group IV. $AgNO_3$ { The colour of the precipitates by this reagent is very characteristic. If the precipitate is white and insoluble in HNO_3, but soluble in dilute solution of ammonia, the presence of a chloride is indicated. Confirm.

Group V. Fe_2Cl_6 A yellowish precipitate indicates a borate. Confirm.

Group VI. H_2SO_4 + $FeSO_4$ { Should the previous reagents give no precipitate, add a crystal of sulphate of iron and a few drops of strong sulphuric acid. The formation of a black colour indicates a nitrate. Confirm.

PART VI.

OUTLINE OF PROCEDURE IN SEARCHING FOR POISONS.

Those portions of the body which are to be subjected to chemical or microscopical examinations, should be carefully placed at the time of the autopsy, by the person performing it, in new, or thoroughly clean glass jars, having air-tight glass covers. Where prompt analysis is to be made, neither alcohol nor any other preservative fluid should be added. When such is added, it should be distilled alcohol and known to be pure; and a carefully sealed and labeled portion of it should be preserved for the chemist to test for impurities. The jars should be sealed, numbered and labeled, and the sealer should affix his initials. The portions of the body to be preserved for the chemist's examinations, are, as a rule, the stomach and contents, a portion of or the whole intestinal canal, the liver, both kidneys, the spleen, the brain, the urine found in the bladder, and upon occasion, the heart, lungs, a portion of or the entire spinal cord, and a portion of muscle taken from the leg. When it is desirable, but impossible to obtain the whole of an organ, the proportion which the part obtained bears to the whole organ should be ascertained. Careful inspection should be made of all organs, sometimes also by a pathologist and a bacteriologist, to exclude other cause of death than by poisoning.

In removing the stomach and its contents from a body for examination, a double ligature should be passed around the esophagus just above the cardiac orifice, and another about the duodenum three or four inches below the pylorus, and the organ removed with its contents thus intact. It is frequently advisable to place each organ intended for analysis in a separate glass jar or other container.

It is rarely necessary to analyze the whole body. As a rule the following are the organs to be examined,

and in this order: the stomach and contents, the liver, spleen, kidneys, heart, lungs and brain; it may, however, be necessary to also examine the spinal cord, uterus, portions of intestines, the blood, etc.

When the material to be analyzed consists of either solids, or solids and liquids to be analyzed together, the solids should be reduced to a finely divided mass, and any liquid portion so mixed with it as to make the whole a uniform mixture. If there be an insufficient quantity of liquid present, it may be necessary to add some distilled water in order to secure a uniform mixture. The mixture should now be weighed and about one-twelfth or one-fifteenth (not over one-tenth) weighed out and employed for preliminary tests. Is proper in systematic analysis to search first for volatile poisons, then alkaloids, then inorganic poisons.

In testing vomited matters, a clear liquid, serviceable for preliminary tests, may usually be obtained by placing them in a cone-shaped glass vessel, and setting them aside for 12 to 24 hrs. In absence of much fluid a small quantity of distilled water may be added and well mixed with these matters before setting them aside.

In making chemical analyses, dialysis is often resorted to, to separate the poison (especially any crystallizable salt) from the complex matters associated with it; either alcohol or water, according to their ability to dissolve the poison, is used as the outer liquid.

During life all the body tissues are alkaline except those of the stomach and the urinary apparatus. For a short period after death all the tissues become more or less acid, but soon change to alkaline, owing to the production of ammonia through the process by which the proteids are changed into waste matter and cast out. The tissues which contain sulphur ultimately change into hydric sulphide, precipitating the sulphides of mercury, lead, arsenic, etc. The hemoglobin of the blood becomes converted into sulphuret-hemoglobin, and ultimately into ferrous sulphate. These two compounds give the body a greenish color in the earlier periods of decomposition.

The analyst, upon receiving the samples or materials for analysis, should note accurately the manner in which they have been packed, that the container was well closed and tightly sealed, and that the seals have not been disturbed; also, whether the container or wrappings were likely to contaminate the samples, the character and wording of the labels, if there be such, and the date and agent of receipt.

Careful observation should then be made of the appearance, smell, color, weight of each solid, the volume of liquid, and the reaction of the samples.

Opium, hydrocyanic acid, or alcohol may be suggested by the smell. The salts of copper, portions of insects, or certain arsenical preparations, or other coloring matter may be suggested by the color. Spots which are characteristic of the sulphides of mercury, lead, arsenic, etc., may occasionally be found long after interment, on or in various organs of the body.

In making his chemical analysis the investigator must insure the purity of the atmosphere of the room in which the investigation is made, the security of the samples in such room, it being accessible only to the analyst, and the perfect freedom of his apparatus from contamination. He must also determine the absolute purity and reliability of his test solutions, by testing them. He should make notes of his work.

A careful hand magnifying-glass and microscopical examination of the suspected organs and their contents is often advisable; the identification and subsequent exhibition of characteristic substances and forms is thus provided for. Before a suspected organ is destroyed in process of investigation, it is often well to photograph it.

The nature of the food last eaten and its bearing on the case is frequently a matter of the utmost importance. Washings of samples and containers should be included in the investigation.

It is as a rule advisable to examine only one portion of the vomited matter, stomach contents, or intestinal

contents, at one time. The other portions should be reserved for subsequent experiments. Inasmuch as the poison may be present in only a very small quantity, the portion of fluid under examination should be concentrated, by evaporation at a gentle heat, to secure the best responses to the various tests. Separation of materials under examination may require resort to dialysis—as in the separation of colloid substances from crystalloids—or to distillation—as in such volatile substances as alcohol, chloroform, prussic acid, phosphorus, chloral, etc.—as well as to such processes as filtration, etc. In the search for an inorganic poison (as antimony, arsenic, etc.) in the presence of organic matter, Fresenius' process is commonly resorted to for the destruction of the organic matter. By this process, the material to be tested, is, after being finely divided, boiled with about one-eighth of its bulk of pure hydrochloric acid, occasionally adding crystals of potassium chlorate, allowing sufficient time each time for the chlorate to decompose, until the materials under investigation are oxidized to a straw-colored fluid; then hydrogen sodium sulphite is added until the mixture gives off an unmistakable odor of sulphurous acid. Most of the metallic poisons are then precipitated in the form of a sulphide by passing sulphuretted hydrogen through the mixture for several hours. By collecting such precipitate, the various tests for identification may be applied.

Poisonous alkaloids are advantageously separated from complex mixtures, by means of either Stas' Roger and Girdwoods, or Uslar and Erdmann's method. Stas uses ether as a solvent. Uslar and Erdmann resort to alcohol.

In Stas' process for separating alkaloids, the following course is pursued: The stomach or intestinal contents, or the solid organs to be tested are digested with acidulated alcohol or water, until such are in a state of solution. Then the whole is filtered and ether added to the filtrate. The ether removes the oily mat-

ters, and is itself then removed and the watery solution neutralized by adding potash or soda. The alkaloid is ultimately separated by ether, when it may be expected to remain behind in suitable condition for the employment of further tests. Some analyzers prefer to modify Stas' process. One of these modifications consists in acidulating the suspected material with hydrochloric acid, then heating it for an hour or more over a water-bath, and filtering the mixture. This process is continued until a pure product is obtained. This product is neutralized by adding hydrogen sodium carbonate, and the freed alkaloid is taken up by shaking the mixture with chloroform or ether. If the mixture then be put in a tall, tightly corked test tube and allowed to stand, the chloroform or ether may be separated by means of a pipette, and upon evaporation the alkaloid will be found ready for additional purification or testing.

The toxicologist resorts to a variety of methods in his efforts to detect traces of poison in suspected substances.

Herold very tersely says: "Combinations are formed with other elements, revealing the poison in the form of solids, liquids or gases. Others are arrayed in varied colors, in crystalline shapes, or volatilized in flame and viewed by the achromatic or apochromatic lenses of the microscope, or their incandescent vapors through the prisms of the spectroscope. For example, the existence of metals is indicated by brilliantly tinted and sharply defined lines, as they are presented in front of the narrow slit of the spectroscope, even infinitesimal traces being accurately noted."

"The great advances made in electricity have contributed the mysterious power of this fluid in toxicological analyses, as is exemplified in the production of ozone for the purple-color reaction for strychnine, or in evolving hydrogen from distilled water for the 'Marsh test.' (Doremus.)"

A SHORT ANALYTICAL PLAN.

A systematic analysis for the detection of poison may be resolved into two principal procedures: 1. Analysis for volatile and inorganic poisons. 2. Analysis for non-volatile organic poisons.

Having reduced the materials to be examined to a uniform mixture by means of thorough division, and, if necessary, also by dilution, a small and carefully weighed portion may be taken for the application of simple preliminary tests. Then the remaining portion may be divided into either three or four parts: one part for the first procedure, one for the second procedure, one part for control tests, and, if deemed advisable, one in reserve for use in case of accident. Each part should be carefully marked. The part provided for the first procedure, *the analysis for volatile and inorganic poisons,* is now acidified with tartaric or acetic acid and put into a distilling flask. The delivery tube is connected with a glass condenser, and the mixture distilled over a water-bath for about half an hour. The products of condensation should be received in a flask in which a little water has been placed. If, upon observing the reaction of the distillate it is found to be neutral, it may contain amyl, ethyl, or methyl alcohol, or anilin, amyl nitrite, carbon bisulphide, chloroform, chloral, coniin, carbolic acid, hydrogen sulphide, lobeline, nicotine, nitro-benzole, or phosphorus. If the distillate is found to be acid, hydrobromic, hydrochloric, or hydrocyanic acid may be present, and they may be identified by the ordinary tests.

The organic matter present in the residue left in the distilling flask should next be destroyed as follows: This residue should be placed in a good sized flask and dilute hydrochloric acid which is known to be free from arsenic, should now be added in sufficient quantity to cover the material, and the whole heated on a water-bath. Crystals of chlorate of potash, in small portions, at intervals sufficient to permit of the decomposition of the chlorate of potash are now introduced; this should be continued until the contents,

of the flask present a clear straw-colored appearance. The object in introducing the chlorate of potash is twofold: first, to oxidize the organic matter; second, to prevent the loss of arsenic through the vaporization of arsenous chlorid. The fluid in the flask is then to be cooled, and air should be drawn through the mixture with an aspirator, until all free chlorine has been expelled; the contents of the flask are then ready for testing for inorganic bases by the ordinary methods.

The portion reserved for the second procedure, i. e., analysis for non-volatile organic poisons, is now treated as follows:

It is put into a distilling flask and about three volumes of absolute alcohol which has been acidified with tartaric or acetic acid is added. Connection should then be made with a return condenser and water-bath heat applied for half an hour or more. The mixture should then be cooled, filtered, the residue washed with absolute alcohol, the washings added to the filtrate and the alcohol distilled off. Then add an equal quantity of water, mix well, filter, and place the filtrate in a cylindrical glass-stoppered jar. This filtrate contains the poison sought, and may be marked F.

Next, after having added an equal volume of ether, and shaken up the resulting mixture, permit it to separate and then remove the ethereal layer. After repeating this operation two or three times, put the extracts together and evaporate them to dryness on the water-bath.

Acetanilid, antipyrine, caffeine, cantharidin, colchicin, digitalin, phenacetin, picric acid, picrotoxin, piperrin, salicylic acid, salol or santonin, may be contained in this extract, and by applying suitable tests to small portions of it, such may readily be identified.

The ethereal layer having been separated from the acid filtrate F., extract with chloroform in the same way as was done with the ether. The resulting extract may contain digitalin, helleborin, narcein or papaverin, for which suitable tests should be employed.

If the foregoing extractions have been fruitless, all chloroform should be expelled from filtrate F. by

warming the latter on the water-bath; it should then be placed in the glass-stoppered cylindrical glass jar, ammonia added to alkalinity, and extraction made by means of petroleum ether. Aconitin, apomorphine, atropine, brucin, cocaine, codeine, narcotine, pilocarpine, quinine, strychnine or veratrine may be contained in this extract. Suitable tests should then be employed for their identification.

If, however, this also results in nothing being obtained, amyl alcohol should be used to extract the alkaline liquid. This extract may contain morphine, and suitable tests should be applied for the identification of that alkaloid.

AUTENRIETH'S METHOD.

In searching for poisons, the general method of procedure of W. Autenrieth, according to Blyth, divides poisonous substances, for the purposes of separation and detection, into three classes:

"I. Poisons capable of distillation from an acid aqueous solution.

II. Organic substances which are not capable of distillation from acid solutions.

III. Metallic poisons.

Where possible, the fluid or solids submitted to the research are divided into four equal parts, one of the parts to be kept in reserve in case of accident or as a control; one of the remaining three parts to be distilled; a second to be investigated for organic substances; and a third for metals. After the extraction of organic substances from part No. II, the residue may be added to No. III for the purpose of search after metals; and, if the total quantity is small, the whole of the process may be conducted without division.

I. SUBSTANCES SEPARATED BY DISTILLATION.

The substances are placed in a capacious flask, diluted if necessary with water to the consistence of

a thin soup, and tartaric acid added to distinct acid reaction, and distilled. In this way phosphorus, prussic acid, carbolic acid, chloroform, chloralhydrate, nitrobenzol, aniline (aniline is a weak base, so that, although a solution be acid, some of the aniline distills over on heating), and alcohol may be separated and identified by characteristic reactions.

II. ORGANIC POISONS NOT VOLATILE IN ACID SOLUTION.

Part No. II is mixed with double its volume of absolute alcohol, tartaric acid added to distinct acid reaction, and placed in a flask connected with an inverted Leibig's condenser; it is then warmed for 15 to 20 minutes on the water-bath. After cooling, the mixture is filtered, the residue well washed with alcohol and evaporated to a thin syrup in a porcelain dish over the water-bath. The dish is then allowed to cool and digested with 100 c.c. of water; fat and resinous matters separate, the watery solution is filtered through Swedish paper previously moistened. If the fluid filtrate is clear, it may be at once shaken up with ether, but if not clear, and especially if it is more or less slimy, it is evaporated again on the water-bath to the consistence of an extract: the extract treated with 60 to 80 c.c. of absolute alcohol (which precipitates mucus and dextrin-like substances), the alcohol evaporated off and the residue taken up with from 60 to 80 c.c. of distilled water; it is then shaken up with ether, as in Dragendorff's process, and such substances as digitalin, picric acid, salicylic acid, antipyrin and others separated in this way and identified.

After this treatment with ether, and the separation of the ether extract, the watery solution is strongly alkalized with caustic soda and shaken up

again with ether, which dissolves almost every alkaloid save morphine and apomorphine; the ethereal extract is separated and any alkaloid left is identified by suitable tests.

The aqueous solution, now deprived of substances soluble in ether both from acid and from solutions made alkaline by soda, is now investigated for morphine and apomorphine; the apomorphine being separated by first acidifying a portion of the alkaline solution with hydrochloric acid, then alkalizing with ammonia and shaking out with ether. The morphine is separated from the same solution by shaking out with warm chloroform (but hot amyl alcohol would be better).

III. METALS.

The substances are placed in a porcelain dish and diluted with a sufficient quantity of water to form a thin soup and 20 to 30 c.c. of pure hydrochloric acid added; the dish is placed on the water-bath and 2 grammes of potassic chlorate added. The contents are stirred from time to time, and successive quantities of potassic chlorate are again added, until the contents are colored yellow. The heating is continued, with, if necessary, the addition of more acid, until all smell of chlorine has ceased. If there is considerable excess of acid, this is to be evaporated away by diluting with a little water and continuing to heat on the water-bath. The dish with its contents is cooled, a little water added, and the fluid is then filtered. The metals remaining on the filter are: silver chloride, lead sulphate, barium sulphate. In the filtrate will be all the other metals.

The filtrate is put in a flask and heated to from 60 to 80 degrees and submitted to a slow stream of hydric sulphide gas; when the fluid is saturated with the gas, the flask is securely corked and allowed to rest for twelve hours; at the end of that time the fluid is filtered and the filter washed with water, saturated with hydric sulphide.

The still moist sulphides remaining on the filter are treated with yellow ammonium sulphide containing some free ammonia and washed with sulphide of ammonium water. Now remaining on the filter, if present at all, will be: mercury sulphide, lead sulphide, copper sulphide, cadmium sulphide. In the filtrate may be arsenic sulphide, antimony sulphide, tin sulphide; and there may also be a small portion of copper sulphide, because the latter is somewhat soluble in a considerable quantity of ammonium sulphide.

The filtrate from the original hydric sulphide precipitate will contain, if present, the sulphides of zinc and chromium in solution.

INVESTIGATION OF THE SULPHIDES SOLUBLE IN AMMONIUM SULPHIDE, VIZ., ARSENIC, ANTIMONY, TIN.

The ammonium sulphide solution is evaporated to dryness in a porcelain dish, strong nitric acid added and again dried. To this residue a little strong caustic soda solution is added, and then it is intimately mixed with three times its weight of a mixture composed of 2 of potassic nitrate to 1 of dry sodium hydrate. This is now cast, bit by bit, into a red-hot porcelain crucible. The whole is heated until it has melted into a colorless fluid.

Presuming the original mass contained arsenic, antimony, and tin, the melt contains sodic arseniate, sodic pyro-antimonate, sodic stannate, and tin oxide; it may also contain a trace of copper oxide.

The melt is cooled, dissolved in a little water, and sodium bicarbonate added so as to change any caustic soda remaining into carbonate, and to decompose the small amount of sodic stannate; the liquid is then filtered.

The filtrate will contain the arsenic as sodic arsenate, while on the filter there will be pyro-antimonate of soda, tin oxide, and, possibly, a little copper oxide.

The recognition of these substances now (by) chemical methods) is not difficult.

INVESTIGATION OF THE SULPHIDES INSOLUBLE IN SULPHIDE OF AMMONIUM, VIZ., MERCURY, LEAD, COPPER, CADMIUM.

If the precipitate is contaminated with organic matter, it is treated with hydrochloric acid and potassic chlorate in the manner already described.

Afterwards it is once more saturated with hydric sulphide, the precipitate is collected on a filter, well washed, and the sulphides treated with moderately concentrated nitric acid (1 vol. nitric acid, 2 vols. water). The sulphides are best treated with this solvent on the filter; all the sulphides mentioned, save mercury sulphide, dissolve and pass into the filtrate. This mercury sulphide may be dissolved by nitro-muriatic acid, the solution evaporated to dryness, the residue dissolved in water acidified with hydrochloric acid and tested for mercury.

The filtrate containing, it may be, nitrates of lead, copper and cadmium, is evaporated nearly to dryness and taken up in a very little water. The lead is separated as sulphate by the addition of dilute sulphuric acid.

The filtered solution, freed from lead, is treated with ammonia to alkaline reaction; if copper be present, a blue color is produced, and this may be confirmed by other tests. To detect cadmium in the presence of copper, potassic cyanide is added to the blue liquid until complete decolorization, and the liquid treated with hydrogen sulphide; if cadmium is present, it is thrown down as a yellow sulphide, while potassic cupro-cyanide remains in solution.

SEARCH FOR ZINC AND CHROMIUM.

The filtrate from the hydric sulphide precipitate is divided into two parts—the one half is used in the search for zinc, the other half is used for chromium.

Search for Zinc.—The liquid is alkalized with ammonia, and then ammonium sulphide is added. There will always be a precipitate of a dark color; the precipitate will contain earthy phosphates, iron, and in some cases, manganese. The liquid with the precipitate is treated with acetic acid to strong acid reaction and allowed to stand for several hours. The portion of the precipitate remaining undissolved is collected on a filter, washed, dried and heated to redness in a porcelain crucible. The residue thus heated is cooled and dissolved in a little dilute sulphuric acid. To the acid solution ammonia is added, and any precipitate formed is treated with acetic acid; should the precipitate not completely dissolve, phosphate of iron is present; this is filtered off, and if hydrogen sulphide be added to the filtrate, white zinc sulphide will come down.

Search for Chromium. — The second part of the hydrogen sulphide filtrate is evaporated to a thin extract, mixed with double its weight of sodic nitrate, dried and cast, little by little, into a red-hot porcelain crucible. When the whole is fully melted, the crucible is removed from the flame, cooled, and the mass dissolved in water and filtered. Any chromium present will now be in solution in the easily recognized form of potassic chromate.

INVESTIGATION OF THE RESIDUE AFTER THE TREATMENT OF THE ORIGINAL SUBSTANCE WITH HYDROCHLORIC ACID AND POTASSIC CHLORATE FOR PRESENCE OF SILVER CHLORIDE, LEAD AND BARIUM SULPHATES.

The residue is dried and intimately mixed with three times its weight of a mixture containing 2 parts of sodic nitrate and 1 part of sodium hydrate. This is added, little by little, into a red-hot porcelain crucible. The melted mass is cooled, dissolved in

a little water, a current of carbon dioxide passed through the solution to convert any caustic soda into carbonate, and the solution boiled. The result will be an insoluble portion consisting of carbonates of lead and baryta, and of metallic silver. The mixture is filtered, the insoluble residue on the filter is warmed for some time with dilute nitric acid; the solution of nitrates of silver, lead and barium are concentrated on the water-bath nearly to dryness so as to get rid of any excess of acid, and the nitrates dissolved in water. Then the silver is precipitated by hydrochloric acid, the lead by hydrogen sulphide, and the barium by sulphuric acid."

THE CORPUS DELICTI.

The "corpus delicti" may be defined as: The injurious substance; the appreciable cause of injury or death. It is the poison, presented in stable condition.

It is not only desirable to so present it, but the law, in some countries, directs that for all cases of forensic chemical research, the poison must be presented to the judge and jury in a permanently stable condition, capable of impressing the senses. This is forensically called the **corpus delicti.**

The following serve to illustrate such: the platinum double-salts of ammonia and alkaloids. Prussian blue from hydrocyanic acid, mercury in the form of red mercuric iodide, oxalic acid in the form of calcium oxalate, spots and mirrors of arsenic and antimony, phosphorus in its natural state, the seeds of various plants such as stramonium, hemlock, and hyoscyamus, the hulls of berries such as belladonna, leaves fragments such as those from digitalis, hyoscyamus, lobelia, root fragments from aconite, the shining, green particles from cantharides, etc.

Questions commonly asked the analyst are: Is the poison combined or free? How was it obtained? Could it exist naturally? How much was found, its strength, and the quantity fatal? If there is no poison, is anything detrimental to health present?

PART VII.

THE SIGNS OF DEATH.

1. Absence of respiratory murmur.
2. Absence of cardiac pulsation.
3. Insensibility and inability to move.
4. Changes in the eyes.
5. Body pallor.
6. Loss of animal heat.
7. Venous coagulation.
8. Rigor mortis.
9. Cadaveric lividity.
10. Putrefaction.
11. Saponification.
12. Mummification.

TESTS.

1. A feather lightly suspended near the mouth or nose remaining unmoved indicates death has occurred.

2. Hold a bright mirror over the mouth and nose of the subject and any respiratory moisture promptly appears upon the glass.

3. The eyes are insensible to light after death, neither dilating nor contracting; but some poisons and some brain affections have similar effects. (Test may be made with candle or lamp).

4. Insensibility of the cornea to touch indicates death, although certain injuries of the brain, etc., produce the same condition.

5. The conjunctivæ exhibit gray, cloudy discolorations, rapidly changing to black, upon their surfaces, due to formation of films of mucus or to cadaveric imbition from decomposition changes.

6. After death, any external pressure on the eye-

ball permanently alters the circular shape of the pupil.

7. Examine cardiac and pulmonary regions carefully, the former with a stethoscope.

8. Apply a ligature to a finger or limb and note if part beyond the constriction becomes a deep-red or purple color—evidence of life.

9. As a rule, scarifying the surface of the body and then applying a cupping glass causes no blood to flow if death has occurred.

10. Open a vein and see if coagulation of the blood has ensued.

If no blister forms when red-hot iron is applied to skin, death is indicated.

11. Inject ammonia solution subcutaneously; if living, a port-wine congestion will appear in the surrounding parts; if dead, it does not appear.

12. Thrust a clean, bright needle into the biceps muscle and leave it there for a time; it will rapidly rust and tarnish (oxidize) if life is not extinct; if it is, no such change results.

Rigor mortis or cadaveric rigidity—the stiffening of the muscles of the body throughout its entire extent, and probably due to the coagulation of the myosin in the muscles—usually takes place inside of six hours after death. Its duration is from 16 to 24 hours—until putrefaction sets in. Heat shortens and cold prolongs rigor mortis. In sudden accidental death while in health, appearance of rigor mortis is delayed, whereas in death from exhausting disease, as phthisis, it promptly appears. Rigor mortis begins in muscles of the eye, then affects muscles of lower jaw and neck, then chest and upper extremities, and lastly muscles of abdomen and lower extremities.

If body is only slightly cold and jaws show signs of rigidity, with glazed eyes and shrunken eye-balls, death has probably occurred within ¼ to 4 hours.

If the whole body is perfectly cold and rigid, death has occurred within 12 hours to 4 days. If cadaveric lividity be present, death has probably occurred in from 1 to 4 days.

PART VIII.

SUDDEN DEATH.

CAUSES OF DEATH.

Sudden death may result from:

1. The action of such poisons as aconite, alcohol, carbolic acid, hydrocyanic acid, oxalic acid, anesthetics, cocaine, mercuric cyanide, potassic cyanide, silver cyanide, irrespirable gases, nitrobenzene, nitroglycerine, nicotine, phosphorus, snake venom, strychnine, etc.

2. Violence: such as a blow upon head, or large blood-vessel, over heart or plexus of nerves, etc.

3. Hemorrhage: cerebral, gastric, aortic, etc. Hemorrhage into pancreas; into peritoneal cavity from ectopic gestation, or ruptured uterus, etc.

4. Rupture of internal organs: as heart, spleen, distended bladder, pregnant uterus, or other organ in the abdominal cavity. Rupture of ulcer in some part of alimentary canal. Rupture of vessel, varicose vein or aneurysm, etc.

5. Such cardiac affections as angina pectoris, aortic regurgitation and other valvular diseases when associated with deficient compensation, cardiac degeneration; the exhaustive effects upon the heart of diphtheria and other poisonous diseases, etc.

6. Thrombosis, embolism, bronzed-skin disease, diabetes, uræmia, epilepsy, intense emotion, etc.

7. Such affections of the respiratory system as: asthma, whooping cough, pneumothorax, hemothorax, pleuritic effusion, acute pneumonia, tumors, foreign bodies in pharynx, larynx, or trachea, membranous deposits, spasm or œdema of glottis or larynx, etc.

MODES OF DEATH.

(Partly adapted from Bichat and Herold).

The actual or immediate cause of sudden death is obviously dependent upon one or other of the three

great centres of life, the heart, the lungs, or the brain. When one of these centres ceases to work, the actions of the others are promptly embarrassed, as the maintenance of life is dependent upon the integrity and activity of each. (Together, these three centers constitute life's "tripod.")

The modes of death have been classified into:—

1—Death beginning at brain, **coma.** (See p. 328.)

2—Death beginning at heart, **syncope.** (See p. 328.)

3—Death beginning at lungs, **asphyxia or apnœa.**

The **immediate** cause of death should be sought in the brain, heart or lungs, no matter what the **remote** cause of the death may be.

COMA.

Coma may be defined as a state of profound insensibility. It is a condition usually dependent upon changed brain conditions.

Causes: May be due to increased amount of blood in blood vessels of brain, to blood or other fluid or solid outside those vessels, or to brain injury. Hence: Compression of the brain; apoplexy; fractures of the bones of the head or other injury to the skull; hydrocephalus; concussion of the brain; the action of narcotics, arsenic, coal gas, or other poisons; various discharges and hemorrhages; certain diseases of the kidneys, such as uræmic poisoning; or of the liver, such as acute yellow atrophy; etc.

Symptoms: Stupor; patient insensible to external impressions; unconsciousness; slow, irregular, stertorous breathing; loss of voluntary control over respiration—as the medulla begins to be affected there is increasingly feeble respiration; pulmonary circulation and aeration of blood ceases; the pulsations of the heart, and lung movements are arrested; the pupils are sluggish and dilation frequently occurs.

Post-Mortem Appearances: More or less blood in the cavities of the heart, but not such an engorgement as when death has resulted from asphyxia.

Usually the brain is congested and there is more or less œdema.

SYNCOPE.

Syncope may be considered to be suspended animation, due to failure in heart action.

Causes: Heart action may have been arrested by either (1) **Anæmia** or (2) **Asthenia.**

1—Anæmia, or less blood than normal: due to sudden loss of blood from ruptured aneurism, uterine or pulmonary hemorrhage, and from cardiac or vascular injury; also suppurations which act indirectly as severe drains upon the blood.

2—Asthenia, or insufficient heart power: due to paralysis of its muscular walls. This may be the result of fatty degeneration or other cardiac diseases, of starvation, of cancer, cholera, typhoid fever, phthisis, diabetes, dysentery, or other exhausting disease; certain poisons, such as digitalis, prussic acid, veratrum viride, etc.; certain injuries, such as blows over the stomach, concussions of the spine, etc.; also severe cerebral lesions; shock.

Symptoms: 1—**Anæmia:** face pale or dusky; lips livid; skin covered with a cold perspiration; sight dimmed; tinnitus aurium; vertigo; pulse irregular and weak; pupils dilated; gradual insensibility. May be nausea, vomiting, irregular respiration, jactitation, photophobia, convulsions; may be hiccough. The nervous symptoms result from the insufficient supply of blood to the brain.

2—**Asthenia:** arrest of circulation in the extremities, producing lividity of the fingers, lips, nose and ears; surface of body and extremities cold; weak, frequent pulse; although great muscular weakness, the senses and intellect are unimpaired.

Post-Mortem Appearances: 1—**Anæmia:** heart empty and contracted; if death was delayed, may be a heart clot; organs and tissues usually pale.

2—**Asthenia:** heart may contain some blood, but its cavity is more or less dilated or flabby from stoppage of blood in the circulation; the blood is in the large arteries and veins; neither the brain nor lungs are engorged.

ASPHYXIA (Apnœa).

Asphyxia is a condition of more or less complete suspension of respiration. Asphyxia from inhalation of poisonous gases may be due to damaging of red blood-corpuscles, so their oxygen carrying power is almost destroyed by the conversion of their hæmoglobin into methæmoglobin, (an internal asphyxia).

Causes: Arrest of respiration resulting from: 1—Mechanical obstruction to the entrance of air into the lungs, as the pressing of foreign bodies in the air passages; a tetanic spasm of the respiratory muscles, produced by strychnine poisoning, tetanus, etc.; pressure of the thorax; muscular exhaustion from cold or debility; paralysis of the pneumogastric or phrenic nerves; submersion; suffocation; hanging; strangulation; absence of air, as in very high altitudes; the effects of sulphuretted hydrogen gas, chlorine gas and other irritant gases. 2—Diseases, such as bronchitis, pneumonia and other lung diseases; spasm or œdema of the glottis; embolism of the pulmonary artery; pharyngeal abscess, and serum blood or pus accumulated in the pleural cavities.

Symptoms: Sense of suffocation, with vigorous effort to breathe; face livid; unconsciousness; vertigo; sphincter muscles relaxed; general convulsions.

Post-Mortem Appearances: The skin and mucous membranes are livid. The lungs may be engorged with dark blood; the bronchi being reddened by both venous engorgement and ecchymoses; they may contain either froth or blood; the pulmonary artery, right cavities of the heart and the venæ cavæ are engorged, and usually the viscera; the left side of the heart, the aorta and the pulmonary veins are comparatively empty; sometimes, however, the cavities of the right side of the heart are empty.

Usually the blood is fluid and dark and may contain a few clots. The veins of the brain are engorged.

Punctate ecchymoses (small dark hemorrhagic points) may be found here and there over surface of brain, lungs or other organs, especially if asphyxia were rapid and were violent attempts at respiration.

PART IX.

PHARMACOLOGICAL TOXICOLOGY, ETC.

The study of the physiological or ultra-physiological reasons, etc., for the various symptoms which are produced by substances in toxic doses, i.e., the basic modus operandi, etc., of the drug, is a most important part of toxicology.

It should be noted that the character and degree of influences exerted by various toxic substances, in relatively proportionate doses, upon man, and upon various animals with similar organs and functions, often differ more or less widely.

Nevertheless, in very many instances, such a degree of parallelism and close relationship exists between the human and animal phenomena produced by various poisonous substances as to command our interest, careful observation and investigation. Furthermore, experience demonstrates that the measures which are successful in neutralizing and combating poisons and their effects in the animal are, as a rule, absolutely identical with those which relieve man.

Hence a careful study of the effects of various poisons upon certain animals, and the measures which are most successful in their treatment, may well furnish information of the highest value in saving human life. All investigations should, however, unquestionably be carried out with no lack of humane considerations.

The animals most suitable for the study and demonstration of the poisonous effects and the proper treatment to be employed in poisoning by various poisons are chiefly the following: Dogs, cats, rabbits, guinea pigs, rats, white rats, mice, monkeys, fowls, pigeons, frogs, turtles and toads. The first four and frogs are most used; as a rule, the best results being obtained by using medium-size dogs. Some poisons have nearly, if not quite, opposite effects upon cats from those which they produce upon dogs; the effects upon dogs being analogous to those upon man. There are other notable differences in animal phenomena, calling for an intimate knowledge of both animal peculiarities and the methods of operation of poisons in such.

Where individuals, or the members of a laboratory group, administer a poison, note the phenomena resulting, and apply suitable remedial measures, the following facts should be carefully recorded: The date, name of the observer or observers, the place, the kind of animal, its color, markings, condition, sex, apparent age, weight, etc. The preliminary measures employed (such as anesthesia, etc.). The name, condition and form of the poison to be employed (its purity; if a solid, liquid or gaseous substance, etc.). The quantity and time of administration of the first and subsequent doses. The effects of each as regards vomiting and excretions, stupor or delirium

or excitement, etc. The position taken by the animal, and if maintained. The muscular action (twitchings and other motions), their regularity or the reverse, frequency, severity, duration, etc. The respirations, their frequency, regularity, force, depth, etc. The pulse, temperature, condition of eyes and mental condition. Additional facts.

Some of the physiological causes of toxic phenomena in man, and the doses to be employed in laboratory demonstrations and investigations upon animals, are given below. Experience teaches that there is a marked individuality regarding the powers of resistance of an animal of a given kind to the effects of a certain poison, as compared with another animal of the same kind which has been given a proportionate dose of the same poison. Allowances for such must be made in computing dosage and in anticipating effects.

Acetanilid. Paralysis of motor and sensory nerves. Depression of heart and vasomotor mechanism, producing immediate fall of arterial blood pressure. Depression of respiratory center, diminished oxygen-carrying power of the blood, and paralysis of peripheral motor nerves. Formation of methemoglobin. Hemolysis may occur. There is loss of heat through vaso-dilatation from the central action.

On frogs it seems to paralyze motor nerve endings. When convulsions occur in animals, such are sometimes of spinal and sometimes of cerebral origin. Doses (toxic). Dog: 0.7 to 0.8 gm. x kilogram by mouth. Rabbit: 0.2 to 0.4 gm. x kg. by mouth.

Anilin. On frog: 2 drops in mouth producing convulsions, cardiac paralysis and death.

Phenacetin. On dog: 0.3 to 0.5 gm. x kg. by mouth toxic and fatal.

Acid, Carbolic. Depression of cerebrum and heart; heart stops in diastole. Arterial tension reduced. Stimulation of center and periphery of vagi. Depression followed by paralysis of respiration from depression of centers. Carbolic acid is absorbed from the stomach particularly when associated with alcohol; and it readily diffuses into the blood, where it probably exists as an alkaline carbolate. Although it is eliminated by all the secretions, such occurs mainly through the lungs and kidneys. In the urine it appears as salts of sulphocarbolic and glycuronic acids, etc., but considerable of the phenol is eliminated without being changed. There is diminished heat production and increased heat dissipation. Fall in blood pressure through paralysis of vasomotor center. In collapse from phenol all the medullary centers and the cardiac muscle are involved, and consequently the collapse cannot be removed by artificial respiration. However, in collapse from drugs of the alcoholic series, the opposite maintains. Dose. Dog: 0.2 to 0.3 gm. x kg. hypoderm., toxic and fatal. Cat: 0.1 to 0.2 gm. x kg. (in solution) hypoderm., toxic and fatal. Rabbit: 0.1 to 0.2 gm.

x kg. hypoderm., toxic; 0.5 to 0.7 gm. x kg. hpoderm., toxic and fatal. Guinea Pig: 0.4 to 0.6 gm. x kg. hypoderm., toxic and fatal. Frog: 1 to 8 mg. (in 5 per cent. solution) hypoderm., toxic and fatal. Anesthetized dog: 50 mg. x kg. in vein, toxic; by stomach 1 to 2 cc. x kg., dilute or concentrated, toxic and fatal.

Acid, Hydrocyanic. There is a primary involvement of the medullary centers, followed by that of other nervous centers. First a stimulation of the respiratory center producing fuller and more rapid respiratory movements. Then convulsive respiratory movements develop, accompanied by dyspnœa, with ultimate paralysis of respiration; falling blood pressure, medullary and cardiac paralysis. Oxygen absorption is prevented, and the failure to reduce the oxyhemoglobin causes the venous blood to retain its bright red color. Dose: 5 to 15 cc. of a 2 per cent. solution is toxic and fatal by mouth. Rabbit, 5 to 10 cc. of the same solution.

Acid, Mineral. By chemical combination with the protoplasm, the tissue is dissolved, i. e., corroded. By coagulation of the myosin, muscular rigidity is produced. In combining with the protoplasm mineral acids neutralize the alkalies and form mineral salts. They combine with the albumin, forming acid albumin. Therefore, their local action is more or less caustic. Dose: hydrochloric acid, toxic and fatal effects. Rabbit, 1 per cent. solution by mouth 1 gm. x kg. Heart action and respiration slowed, paralysis and convulsions followed by death. Guinea pig, 5 to 30 cc.

Acid, Oxalic. Affects central nervous system, especially the medullary centers. The mental functions and reflexes are first stimulated and then paralyzed. Death may be due to either cardiac or respiratory paralysis. Dose: Rabbit, 2 to 4 gm. by mouth, toxic and fatal. Guinea pig, 0.1 gm. hypodermically, toxic and fatal. Frog, 0.05 to 0.1 gm. hypodermically, toxic, may be fatal.

Aconitine. The vasomotor center successively stimulated and depressed, and a very variable blood pressure occurs. The effects upon the heart are the result of direct action upon the heart muscle and also due to a stimulation and depression of the vagus and the accelerator mechanisms. There is increase in the rate of the heart action for a time. The heart becomes very arhythmic. Finally the medullary centers are paralyzed. Blood pressure is lowered by direct depression of the heart or its motor ganglia. Ultimately the heart is arrested in diastole. Clonic convulsions may result through interference with the cerebral circulation. The sensory neurons of the spinal cord and the sensory filaments of the peripheral nerves are depressed. As aconitine has a sedative effect upon the stomach, toxic doses may not vomit. Dose: Aconitine, rabbit, 1.5 mg. x kg. hypodermically. Guinea pig, 2 mg. x kg. Pigeon, .06 mg. x kg. Frog, 0.2 mg. x kg. hypodermically.

Apomorphine. On central nervous system, first stimulant then paralyzant in its action. The cardiac muscle may be paralyzed, also the respiratory center. Dose: Dog, 2 to 4 mg. x kg. hypoderm. causes emesis by action on medullary center. Rabbit, same dose acts as a cerebral stimulant, causing excitement, but does not vomit. Grain $\frac{1}{250}$ to $\frac{1}{150}$ applied to frog's heart diminishes action and causes paralysis.

Arsenic. There is a fall in blood pressure, chiefly the result of the following: A peripheral vascular paralysis (capillary). Depression of the vasomotor center and diminished cardiac action. A great amount of blood is drawn from the general circulation by the distention of the splanchnic area, thus reacting upon other organs, and a paralysis of the central nervous system may result. There is increased permeability of the capillary walls. In the intestine there is marked exudation into the connective tissue.

Dose. Liquor Potasse Arsenitis (U. S. P.): Dog, 1 cc. x kg. by mouth, toxic and fatal. Rabbit, 1 cc. by mouth, fatal as a rule.

Belladonna (Atropine). Stimulation followed by paralysis of various parts of the central nervous system, particularly of the medullary and cerebral centers. A primary paralysis of certain peripheral nerve endings, as those governing secretion, accommodation, and the action of cardiac and intestinal muscle. Primarily stimulation, subsequently paralysis of smooth and cardiac muscle.

Dose. Atropine Sulphate: Dog, 20 mg. to 0.4 x kg. hypoderm. produces paralysis of vagi and proves fatal as a rule. Cat, 0.05 to 0.08 gm. x kg., paralysis of vagi. Rabbit, 1 to 2 gm. x kg. hypoderm., toxic. Dog (anesthetized), 1 mg. x kg. hypoderm., vagi paralyzed. Rabbit (anesthetized), 10 to 15 mg. x kg. hypoderm., prompt paralysis of vagi. Guinea pig, 0.5 to 0.8 gm. hypoderm., fatal. Frog, 0.1 gm., fatal dose. Solution 1/6 to 1/10 per cent. applied to frog's heart causes arrest of mucous secretion and paralysis of vagus.

Chloral. Depression of cortical cells of brain and of spinal cord. Respiratory center depressed, and its function may entirely cease from paralysis. There is an increased destruction of proteids. Chloral produces a destructive influence upon the blood and the blood vessels. Muscular metabolism is diminished through a lessened muscular activity. There is lessened oxidation in the cells of the body, and an increased heat dissipation owing to dilatation of the cutaneous vessels; a diminished heat production and reduction of bodily temperature.

Dose: Dog (anesthetized), 0.5 to 2 gm. x kg. in vein, toxic. Cat, 0.15 gm. x kg. by mouth, toxic and fatal. Frog, 0.1 gm., toxic and fatal.

Chloretone. In true narcotic doses chloretone is more dangerous than chloral, *but is useful as an anesthetic for lab-*

oratory animals, because of not requiring attention even in protracted operations. But when recovery of the animal is desired, as when no post-mortem changes are to be observed, it should not be used. The dog is given 20 mg. x kg. of morphine, and when vomiting has occurred, 0.2 gm. of chloretone per kilogram of animal is introduced into the animal's stomach by means of the stomach tube; the chloretone is previously dissolved in the smallest quantity of alcohol which will dissolve it. Anesthesia occurs in 15 to 30 minutes, and usually continues for several hours. In dogs there is a slow fall of blood pressure from chloretone. In rabbits the fall is rapid.

Among the toxic effects of choloretone are a lowered blood pressure through a depression of the heart and vasomotor center, central vasomotor paralysis and cardiac depression. A great lowering of temperature and diminished consumption of oxygen from the effects produced upon metabolism.

Dose: Rabbit, ½ ounce x kg. of a saturated aqueous solution given per rectum usually is toxic and fatal. 0.2 to 0.3 gm. x kg. dissolved in alcohol and given per rectum, toxic and fatal.

Chloroform. Depression of motor and sensory neurons of spinal cord. Medullary depression resulting in slowed respirations and fall of blood pressure. Vasomotor and cardiac paralysis, and diminished heat production. Probably there is a lessened irritability of the heat-regulating centers. Dose: Dog, cat, etc., 1 to 2 drachms hypodermically into femoral vein has toxic effect and produces rigor. Frog, 0.45 cc. hypodermically, toxic and fatal.

Cocaine. Depression of spinal cord and peripheral nerves, particularly of the sensory nerve filaments and of the sensory columns. Vasomotor paralysis and depression of cardio-inhibitory centers. Marked reduction in arterial pressure. Paralysis of the respiratory center.

Dose: Dog, 15 to 30 mg. x kg. hypoderm., commonly fatal. Rabbit, 60 to 70 mg. x kg. by mouth, toxic; 100 to 500 mg. x kg. hypoderm., usually fatal. Guinea pig, 60 to 70 mg. x kg. hypoderm., toxic and fatal. Frog, 3 mg. fatal. 1 per cent. solution applied to vascular surface causes vaso-constriction and temporary paralysis of nerve trunks.

Conium (Coniine). Paralyses of both ganglia and motor endings. Action is therefore half-way between that of curare and of nicotine. The central nervous system, particularly the medullary centers, depressed, and the symptoms which occur are referable chiefly to the motor system. An ascending paralysis ensues; it is probably due to a reduced conductivity of the cord to impulses coming from the brain. The first interference being a blocking of the path, to those impulses which have the greatest distance to travel. The ascending paralysis gradually proceeds from the lower extremities to the tongue; thus speech may be lost while the brain is still active and the mind clear. The historic symptoms of Socrates,

after drinking the fatal cup of hemlock, well exemplify the leading features of an ascending paralysis thus induced.

Dose: Dog, 0.2 to 0.4 gm. x kg. hypoderm., toxic. Cat, 0.05 to 0.4 gm. hypoderm., toxic and fatal. Rabbit, 80 to 100 mg. x kg., toxic and fatal. Guinea pig, 0.5 x kg. hypoderm., toxic and fatal. Frog, 0.06 gm. x gm. hypoderm., toxic and fatal.

Convallaria. Action similar to that of Digitalis. Dose: Guinea pig, 0.04 to 0.1 gm. x kg. hypoderm., toxic and fatal. Frog, 0.26 to 0.30 mg. x gm., toxic and fatal.

Curare. Paralysis of ends of motor nerves distributed to respiratory muscles. Central paralysis may result. End plates of motor nerves of striated muscles are paralyzed, the respiratory and smaller muscles being affected first. Unstriped muscle terminations and sensory nerves are unaffected. There is a paralysis of the peripheral ganglia sympathetic. There is a reduction in blood pressure and a diminished general metabolism. Although in warm-blooded animals death results from a paralysis of the respiratory muscles, nevertheless, if the dose has been barely large enough to produce a respiratory paralysis, recovery may occur if artificial respiration be maintained. In cold-blooded animals where the respiratory exchange occurs chiefly through the skin, respiratory movements not being necessary, elimination of the poison gradually takes place if the animal be kept in a moist atmosphere so as to favor such action. Direct application of curare to the spinal cord causes the typical convulsions of strychnine poisoning; as ordinarily administered such effects are masked by the paralysis of the nerve endings. Sometimes, however, typical strychnine convulsions appear before the development of the typical curare action. Dose: Frog, ¼ to 3 cc. of a 1 per cent. solution of curare, introduced into dorsal lymph sac of frog, toxic, paralyzant.

Digitalis (Digitalin, Digitoxin). Vagus center partially paralyzed, or may be intense irritability of cardiac muscle, resulting in delirium cordis. An arhythmia; inefficient cardiac contractions and cardiac exhaustion with relaxation in diastole. The blood pressure is irregular and ultimately it is greatly lowered. Inasmuch as absorption of digitalis occurs more rapidly than its elimination, it has an accumulative effect when given at about the limit dosage or over a protracted period in large doses. Dose: Dog (anesthetized), 1 to 5 mg. x kg. hypoderm., toxic. Frog, 3 to 5 mg. hypoderm., toxic and fatal.

Ether. Over-stimulation and paralysis of respiratory center. Great reduction in temperature from depression of circulation and respiration, and rapid evaporation of the ether, by which body and lungs are chilled. The nervous mechanism governing the heat centers appears not to participate in this effect. Dose: Dog (anesthetized), 8 to 15 cc. hypoderm., toxic. Frog, 6 to 8 cc. hypoderm., toxic and fatal.

Formaldehyde. Large doses injected into the blood cause

coagulation, producing methemoglobin and hematin. Dose: Rabbit, 0.25 to 0.5 gm. x kg. hypoderm., toxic and fatal.

Gelsemium (Gelsemine). Depression of heart and of spinal cord, especially of its motor neurons. The peripheral filaments of the cranial nerves are paralyzed, also gradually the respiratory center. Its mydriatic action appears to be due to a paralysis of the motor oculi nerve. Dose: Guinea pig, 2 to 6 gm. x kg. hypoderm., toxic and fatal. Frog, 7 to 15 mg. x gm. hypoderm., toxic and fatal. Local application to heart of 2 per cent. solution causes paralysis.

Hyoscyamus (Hyoscyamine). Action similar to Belladonna. Dose: Guinea pig, 10 gm. x kg. hypoderm., toxic and fatal. Frog, 10 to 15 mg. x gm., toxic and fatal. Hyoscyamine: Cat, 0.03 to 0.06 mg. hypoderm. causes paralysis of vagi. Frog, 5 to 10 mg. hypoderm., toxic and fatal.

Iodine (Iodides). Employed internally, rapid absorption occurs in the form of iodides, and promptly appears in all of the body secretions. Most of it is removed in the urine in the form of iodides. Iodides in the blood are supposed to be converted into sodium iodide without affecting the composition of the blood. It is supposed that they form a loose combination with proteids. It is asserted that potassium iodide dilates the blood vessels, thus increasing the secretion of glands. Dose: Dog (anesthetized), tincture of iodine 4 cc. hypoderm., toxic. Rabbit (anesthetized), 0.1 to 1.0 gm. x kg. hypoderm., toxic and fatal.

Ipecac (Emetine). Reduction of temperature by poisonous doses. In dogs very large doses produce cardiac paralysis, especially if injected into the jugular vein. Dose: Dog, emetine, 1 to 2 mg. x kg. hypoderm., emetic. Dog, cat, rabbit, 0.1 to 0.2 gm. x kg. hypoderm. or 0.02 to 0.05 gm. x kg. injected into femoral vein is promptly toxic; fatal. Frog, 5 to 10 mg. hypoderm., toxic, paralysis, fatal.

Mercury (Corrosive Sublimate). The soluble salts of mercury to some extent inhibit the digestive properties. The insoluble salts are somewhat irritating and produce increased peristalsis and secretions. They act but slightly upon the digestive ferments. Leukocytosis, etc., may be produced by large doses. Dose: Dog corrosive sublimate, 1 to 2 ounces of one per cent. solution by mouth toxic, producing more or less corrosion of alimentary canal. In rabbit same dosage fatal, with alimentary canal corrosion.

Methylene Blue. There is a strong affinity between the axis cylinders of nerves and methylene blue. Dose: Dog (anesthetized), 0.1 to 0.2 gm. in solution into femoral vein, toxic and fatal.

Muscarine. Stimulates the cardiac endings, which are paralyzed by atropine. Contractility of skeletal muscles is diminished. Fall of blood pressure. Vasomotor paralysis. Dose: Dog, ½ to 3 mg., toxic; 1 mg. hypoderm, produces toxic ef-

fects; 3 to 12 mg., toxic and fatal effects. Frog, 5 to 7 mg. hypoderm. paralyzes vagi and fatal.

Opium (Morphine). Stimulates vagi both centrally and peripherally and slightly stimulates the heart or the ganglia which it contains. Paralysis of vagi and heart with resultant rapid, feeble pulse finally occurs. It is supposed that opium depresses both the cerebral perceptive centers and the afferent paths in the spinal cord. Morphine locally employed directly depresses the sensory nerve filaments. It is a powerful respiratory depressant even to the point of paralysis. Peristalsis is stimulated in toxic doses, the inhibitory nerves being paralyzed. The pupils are contracted through stimulation of the motor oculi centers. Dryness of mouth and thirst result from the checking of the secretions of the salivary glands by it. All of the bodily secretions, except that of perspiration, are lessened. Over-stimulation, and consequent exhaustion of the vasomotor center and vagi, produces a rapid and weak pulse. Lactic acid forms in the blood through defective oxidation. Dose. Morphine sulphate: Dog, 5 to 7 mg. x kg. hypodermic produces vomiting; 0.3 to 1.0 gm. injected into femoral vein of medium-sized dog is toxic. Cat, 40 mg. x kg. produces excitement. Rabbit, 0.15 to 0.3 gm. x kg. hypodermic is toxic and fatal; 0.5 to 1.0 gm. x kg. by mouth is narcotic, toxic and fatal, as a rule. Guinea pig, 0.5 to 0.7 gm. x kg., toxic and fatal. Frog, 0.05 to 0.08 gm. in posterior lymph sac, toxic, may be tetanus, and fatal. (Thebaine, one of the alkaloids of opium, belongs to the strychnine group of motor excitants, acting largely upon the spinal cord, causing an increase in the activity of its reflex functions.)

Nux Vomica (Strychnine). Augmented susceptibility to external stimulation, the slightest external stimulus producing a greatly exaggerated reflex. Spasmodic and distressing muscular contraction, chiefly affecting the extensors. Opisthotonos. Toxic doses of strychnine ultimately produce paralysis of the motor apparatus, with loss of voluntary movement, the result of over-stimulation of the reflex centers in the spinal cord, causing exhaustion of the same. The pulse is slowed and weakened, due to an over-stimulation of the motor mechanism and of the heart muscle itself. Blood pressure is increased and the visceral vessels constricted. Asphyxia may occur through interruption of breathing from the tetanic contractions of the respiratory muscles; these muscles finally become exhausted and death occurs from the excessive tetanic contraction and asphyxiated condition or from paralysis of the respiratory center. Respiration may cease some time before the heart stops. Dose. Strychnine Sulphate: Dog, cat, 0.75 to 1.0 mg. x kg. hypodermic, toxic and fatal. Dog, 2 to 4 mg. x kg. by mouth, toxic and fatal. Rabbit, 4 to 5 mg. x kg. by mouth, toxic, may be fatal; 0.58 to 0.6 mg. x kg. hypoderm., toxic and fatal. Guinea pig, 4.5 to 5.0 mg. x kg., toxic and

fatal. Tetanus convulsions may be produced by much smaller doses. Note, in convulsions in frog legs are extended and arms flexed. Is possible to hold frog in horizontal position by the feet. Convulsions commonly intermit, frog paralyzed between spasms. Spasms start with cry.

Paraldehyd. Cardiac exhaustion and lowered arterial pressure. Depression of respiratory center and finally paralysis. Dose: Dog, etc., 1 to 2 gm. x kg. anesthetic. Rabbit, 3 to 5 gm. x kg. by mouth paralyzes vasomotors.

Phosphorus. Cardiac depression. Kidney epithelium irritated. Fatty degeneration of retinal capillaries. It is believed that a portion of the phosphorus is oxidized in the stomach. Then the phosphoric acid which is formed combines with the alkalies and enters the blood in the form of phosphates. Some of the phosphorus appears to be dissolved in the oils and fats which are contained in the stomach and probably passes into the circulation in the form of elementary phosphorus. Dose: Dog, 20 to 30 mg. x kg. by mouth (in oil or mucilage), toxic and usually fatal. Produces transitory leucocytosis.

Physostigma (Physostigmine). Powerful stimulation of intestinal contractions. Depression of medulla and spinal cord. Abolished spinal reflexes, finally paralysis of medullary centers. It causes fibrillary twitchings from its action upon muscle substance. The fibrillary twitchings of aconite poisoning are due to its action on motor endings. Dose. Physostigmine Salicylate: Dog, 4 to 6 mg. x kg. hypoderm., toxic and fatal. Cat and rabbit, 2 to 4 mg. x kg. hypoderm., toxic and fatal. Guinea pig, 4 to 6 mg. x kg. hypoderm., toxic and fatal. Frog, 0.5 to 0.8 mg. hypodermic, toxic and fatal. Dog (anesthetized), 0.5 to 3 mg. x kg. hypoderm. removes effect of curare.

Picrotoxin. Acts chiefly on medulla. Clonic convulsions, increased respirations. Slowed heart and pulse, rise in arterial pressure. Increased reflex irritability of spinal cord. Vasomotor center stimulated. Depression of cardiac muscle. Finally all stimulant action gives way to paralysis. Medullary centers paralyzed. In the *frog* spasms of the laryngeal muscles result in distention of the body with air and a characteristic cry quite like that frequently heard in poisoning of a frog with strychnine. The convulsions are cyclic and occur, as a rule, only after a period of depression. Between the convulsive periods the frog often appears to be paralyzed. Since in convulsions the action may be located in the sensory nerve endings, in the brain, the medulla, the spinal cord, the motor endings, or even the muscle fibers, it is interesting to locate such action in using the various convulsants. Motor stimulation may be central or peripheral. When central it is abolished by progressive destruction of the central nervous system, and its exact location thus noted. In poisoning of a frog by picrotoxin it is seen to be located in the medulla; by strychnine in the spinal cord; by atropine and cocaine in the cere-

brum itself. Peripheral motor stimulation, not abolished by nerve section upon test, but abolished by curare, hence in the motor endings, as by aconitine and nicotine poisoning; not abolished by nerve section or by curare, hence in the muscle fibers, as in poisoning by caffeine, physostigmine, and veratrine. In picrotoxin, emprosthotonos and may be "bucking." Convulsive action chiefly on flexor muscles. Dose: Dog, 10 to 15 mg. x kg. hypoderm., toxic; convulsions, paralysis, death; 0.06 to 0.1 gm. x kg. by mouth, toxic and fatal. Cat, 1 to 2 mg. x kg. hypoderm., toxic. Guinea pig, 5 to 10 mg. x kg. hypoderm., toxic; 10 to 15 mg. x kg. hypoderm., fatal. Frog, 5 to 8 mg. hypoderm., convulsant; 10 to 15 mg. hypoderm., fatal.

Pilocarpine. Primary stimulation is followed by depression of the nerve endings, the ganglia and cells. There is depression of the respiratory center, and vasomotor paralysis. Motor centers, especially of the cord, are paralyzed (atropine is a physiologic antidote). Finally a marked paralysis of various parts of the central nervous system. Late there is a paralysis of the motor oculi endings. When pilocarpine is applied to the heart of a frog it produces stimulation, then paralysis. It appears to be a direct paralysis of the heart muscle. Dose. Pilocarpine Hydrochloride: Dog, rabbit, etc., 5 to 8 mg. x kg. hypoderm. causes free salivation. Rabbit, 0.4 to 0.5 gm. hypoderm. x kg., toxic. Guinea pig, 0.04 to 0.05 gm. x kg., toxic and fatal. Frog, 0.05 to 0.1 gm., toxic and fatal.

Potassium Permanganate. Gives up a part of its oxygen when it comes in contact with organic matter.

Silver Nitrate. Precipitates the albumin of the cells with which it comes in contact, and contracts the blood vessels. In its concentrated state a caustic, coating the parts affected with a silver albuminate; but its corrosive effects are superficial, owing to the impenetrable character of the coagulum, promptly formed. Therefore its astringent action is exerted mainly upon the gastric mucous membrane, when it is swallowed. Only a very small proportion of that swallowed enters the circulation. Dose: Characteristic effects may be obtained with 10 to 20 per cent. solutions, under anesthesia, or by weaker, otherwise.

Strophanthus. Much resembles digitalis in its action, but differs in some respects. In concentrated form it acts as a muscle-poison, producing paralysis and a tonic contraction of the fibers. It is eliminated about as rapidly as it is absorbed, consequently has little or no cumulative effects. Dose: Rabbit, 0.1 to 0.2 gm. hypoderm., toxic and fatal. Guinea pig, 7 to 10 mg. x kg., toxic and fatal. Frog, 0.01 to 0.03 mg. x gm., toxic and fatal. Dog (anesthetized), 0.05 to 0.15 gm. x kg., toxic, fatal.

Tobacco (Nicotine). The peripheral effects of nicotine are quite similar to those of pilocarpine, except that the action is confined to the ganglia, and paralysis promptly follows stim-

ulation. The nicotine effects may be removed by atropine or muscarine. Nicotine convulsions are not entirely located in the spinal cord, but also in the medulla and hind brain. Stimulation of the central and ganglionic vagus slows the heart, but subsequent paralysis of the vagus ganglia suddenly greatly quickens it. Increasing depression of the vasomotor ganglia dilates the blood vessel and reduces the blood pressure. Finally reduced coronary pressure wears out the heart muscle. After short stimulation effect, nicotine paralyzes the ganglia in relation to unstriped muscle. (Curare acts chiefly upon end plates, nicotine upon ganglia.) Upon frogs nicotine causes, in toxic doses, first an extension of the forearms, finally also of the hind legs. Dose: Dog and rabbit, a few drops of the alkaloid dropped upon the tongue of the animal usually causes convulsions. Dog, 0.05 to 0.2 gm. hypoderm., toxic and fatal, as a rule. Rabbit, 20 to 30 mg. x kg., toxic and usually fatal. Guinea pig, 30 to 50 mg. x kg. hypoderm., toxic and fatal. Frog, 2 to 4 mg. hypoderm., toxic and usually fatal. Dog or cat (anesthetized), 2 to 12 mg. x kg. hypoderm., toxic effects; vagus stimulated, then paralysis, paralysis ganglia.

Veratrine. Causes striated muscles to respond intensely to stimuli and there is a great prolongation of the period of contraction. Ultimately the muscles become paralyzed. Depression of medullary centers and heart. Convulsions result from stimulation of spinal cord centers. In many respects veratrine acts like aconite. It finally depresses the central nervous system more or less generally. In rabbits one of its common toxic effects is to make the animal "buck." It is corrosive. Frequently causes dizziness and blindness from its superior central action. Dose. Veratrine Sulphate: Rabbit, 2 to 3 mg. x kg. hypoderm. causes convulsions; 1 cc. of 1 per cent. solution by mouth causes corrosion of stomach. Rabbit (anesthetized), 8 to 10 mg. hypoderm. paralyzes heart. Frog, 1 mg. hypoderm., toxic and fatal, as a rule; ½ per cent. solution applied to frog's heart stops it in systole.

THE PRODUCTION OF ANTI-TOXINES FROM MINERAL AND VEGETABLE POISONS.

It is possible that the common mineral and vegetable poisons, such as arsenic, lead, mercury, atropine, morphine, etc., may cause the formation of antitoxines, as do the organisms of diphtheria, tetanus, etc., when administered for such purpose. Hirschlaff claims to have been successful in producing an antitoxic serum capable of counteracting poisoning by morphine. He injected gradually increasing doses of morphine into rabbits and then administered, to other rabbits, some of the thus prepared serum, along with fatal doses of morphine. He claims to have found that much larger doses of morphine could be administered

without fatal effects, when associated with such serum than without the latter. Also that the same serum was similarly protective to mice. He furthermore claims to have demonstrated that the antitoxic-rabbit's-serum is beneficial in acute morphine poisoning of the human ; and that in cases of the morphine habit, it enables the victim to promptly discontinue the drug without experiencing the distressing nervous symptoms commonly encountered. However, this and other sera of similar character, such as an alcoholic-serum, etc., have as yet not been so satisfactorily demonstrated as to be accepted by the scientific world. Further demonstration is necessary for acceptance.

THE FATAL DOSE, AND CAUSES OF DEATH

It is very difficult to declare positively the exact fatal dose of any particular poison. Age of person, condition of stomach as regards food, early and free vomiting, tolerance of that particular poison from habit or otherwise, etc., all more or less influence the effect and result.

Even in some authenticated cases, the exact quantity is unknown, and in others the strength of the preparation used is not stated.

Some poisons are exceedingly active or deadly in very small doses. Among these are Aconitine gr. 1/10; Digitaline gr. ¼; Hydrocyanic Acid gr. 1; Strychnine gr. ½; etc., also some animal poisons, such as the venom of certain snakes, the bite of the tarantula, etc. Some of the toxines are exceedingly poisonous. The toxin of diphtheria is so poisonous that, it is said, so small a quantity of it as one four-millionth of the body-weight will produce death.

Poisons may cause death: by producing great reduction in body temperature; by hemorrhage due to corrosive perforation of blood vessels; by severe pain, protracted vomiting or convulsions producing exhaustion; by cerebral or cardiac paralysis; by swelling of the glottis or epiglottis; by pulmonary edema; etc.

The poison may be chemically discovered in the living body, in its blood or urine, or even in the serum of a blister. In the corpse the poison may be found in the blood, in the viscera or other tissues or in the secretions.

PECULIAR FOOD AND DRUG EFFECTS

(Produced by the ingestion of them)

SUBSTANCES EXCRETED IN MOTHER'S MILK

When certain substances are taken by a nursing mother, commonly they are excreted in her milk. Such are Ammonia and various aromatic and volatile oils (such as the oils of Anise, Cumin, Dill, Wormwood, etc.); also Garlic, Turpentine, and Copaiba; the purgative principles of Rhubarb, Senna, Castor Oil, and Scammony, etc.; also Opium, Iodine, Iodides, Antimony, Arsenic, Bromides, Quinine, Sulphur, Hexamethylenamin, Bismuth, Iron, Lead, Mercury, and Zinc. Therefore, the actions of certain drugs administered to the mother may be observed in and may even poison her child; among such are Opium, Arsenic, Potassium Iodid, Mercury, etc.; Senna, Castor Oil and some other purgatives may act as drastic cathartics, influencing the action of other drugs or of irritant or other foods.

SUBSTANCES CAUSING SKIN ERUPTION OR ITCHING

Antimony, Antipyrine, certain sera—antitoxins, vaccines, glandular extracts, etc. Arsenic, Arsenicals, Belladonna, Boric Acid, Bromides, Cantharides, Cinchona, Chloral, Copaiba, Croton Oil, Crowfoot, Cubeb, Emetin, Ergot, Iodine and Iodides, certain essential oils and aromatic substances, such as Cloves, Pennyroyal, Peppermint, etc.; also Hexamethylenamin, Hyoscyamus, Morphine, Opium, Mustard, Phenol, Quinin, Salol, Salicylic Acid, Sulphonal, Tar, shell fish, currants, red berries, tomatoes, pickles, cheese, etc. Also food proteins, and synthetic compounds.

SUBSTANCES ALTERING COLOR OF URINE

Dark green, or brown—Phenol.

Bluish green—Methylene Blue. (If acid.)

Brown or greenish-brown—Phosphorus, Phenol, Lead, Mercury, etc.

Yellow or yellowish—Phallin, Phosphorus, Diamin, Rhubarb, Santonin. (If urine acid.) Salol, Toluene, Senna, etc. (If urine alkaline.)

Purple—Santonin. (If urine alkaline.) Yellow. (Acid).

Red or reddish—Santonin. (On exposure to air.) Senna. (If urine acid.) Solanin, Sulfonal, Phallin, Antipyrine, Fuchsin, Trional, etc.

Very dark, black or smoky—Sulfonal, Phenol, Creosote, and various kidney irritating drugs.

A light color—produced by drugs which increase the amount of the urine, (as, Potassium Salts, Digitalis, etc.).

SUBSTANCES PRODUCING ODOROUS URINE

Acid Hydrocyanic (odor of bitter almonds), various ethereal (essential, volatile) oils, and their vegetable sources, Turpentine, Cubeb, Asparagus, Gin, etc.

SUBSTANCES ALTERING COLOR OF FECES

Deeper color—Purgatives.

Black or dark gray—Bismuth salts, Iron, Lead, Manganese, etc.

Green or greenish—Colchicum, Mercury (as Calomel, etc.), etc.

SUSPICIOUS SYMPTOMS OF POISONING.

(GENERAL HINTS)

When a person apparently in good health suddenly becomes sick, vomiting or purging or both, or showing symptoms of great vasomotor disturbance, or marked cerebral symptoms, one should suspect the invasion of some acute disease, the presence of a severe gastro-intestinal irritant, or the action of some active poison, in the absence of a history of shock. If several persons are affected in the same way a food poisoning should be suspected.

Convulsions, if present, might be due to acute disease, some gastro-intestinal irritant, or such poison as one of the alkalies, or strychnine, etc. Vomiting and purging might be due to disease or to such poison as ptomains, salts of the metals, aconite, alkalies, arsenic, or corrosive sublimate, etc.

As a rule, when vomiting and purging occur they are nature's methods of removing that which is a menace to the individual and they should be judiciously encouraged.

Great disturbance of heart action or of respiration, marked change in the color or appearance of the skin, a quick, feeble pulse, hyperesthesia, anesthesia, prickling sensations, pupillary, speech, and temperature changes, stupor and coma, are phenomena which may point to acute disease or to a powerful irritant narcotic or depressant poison.

Inquire as to the patient's recent experiences, such as history of fall, exposure to elements or contagion, etc.; also regarding medicines, food and drink taken, and observe source and any remnants of them. Test them, if necessary. Carefully inspect the vomit and excretions, noting color, odor, reaction and presence of foreign substances, such as undissolved poison, parts of poisonous plants, etc. A peach-like or bitter almond odor of breath or vomit would cause one to suspect hydrocyanic acid poisoning; the peculiar odors of alcohol, ether, formaldehyde, opium, lysol, phenol, etc., are characteristic of the respective poison and should guide to confirmation by other evidences than odor. Observation of the urine as to its appearance and color may reveal the red color of antipyrine or fuchsine, or the greenish of methylin blue, phenol or mercury, etc. Often in suspicious cases it is wise to remove and subject to prompt chemical and microscopical tests not only vomited matters and the first stomach washings, but also medicine and food remnants.

As it is very humiliating to a physician to have others discover that what he had taken for disease was a plain case of poisoning, it behooves him to be on his guard and painstakingly observant. (See also pages 251, 324.)

TRANSFUSION

The term transfusion is somewhat indefinite, inasmuch as it may mean the transferring of blood from one person to another, the introduction into an individual of blood taken from the blood vessels of another person, or the introduction of a saline solution or other substance into the blood vessels or some cavity of an individual.

The term direct transfusion, or the transferring of blood from one person to another without exposing the blood to the air, is more definite, and the process has certain decided advantages over that of indirect transfusion, which is the transferring of blood from a cup or other container to a blood vessel.

Normal or physiologic salt solution (see page 118), or some modification of it, by intravenous injection, or otherwise, is useful after profuse hemorrhage, severe diarrhœa, etc.; but it does not contain the red blood cells which may be requisite to replace those damaged in gas poisoning, etc., and it lacks fibrin ferment and fibrinogen, which are so essential in hemophilia; likewise, it lacks the elements necessary for the nutrition of brain cells which have been damaged by shock.

Blood transfusion is a central nervous and a cardiac stimulant. It supplies deficiencies and meets conditions for which saline transfusion is inadequate.

Blood transfusion is especially serviceable in carbon monoxide and other gas poisonings; in poisoning by the saponins; in the poisonings by substances which produce methemoglobinemia, such as potassium chlorate, anilin and various other coal tar derivitives, picric acid, carbon disulphide, amyl and sodium nitrite, nitroglycerin, nitrobenzene, bromin, hydrogen cyanid, chromic acid and poisonous mushrooms; in the profound toxic conditions produced by the proteins of various foods and other agents; in the after effects of severe hemorrhage unassociated with hemolysis; also in certain other condi-

PART X.—UNCONSCIOUSNESS OR COMA.—Its Interpretation and Treatment.

GENERAL POINTS ON UNCONSCIOUSNESS.—To tell if person is unconscious, raise eyelid and touch white of eye; patient will blink if conscious. Observe state and position of patient's body. Place patient on back, head to one side, so that tongue or vomited matter will not obstruct windpipe. If face be pale, keep head low; if flushed, elevate it. Loosen clothing about neck, chest and waist, and straighten arms and legs. Place away from objects of injury. Test eyes for condition of pupils, squinting, response to light and touch. If pupils equally contracted, probably poisoned by opium; if unequally contracted, probably injury to brain; if pupils sensitive to touch, probably no injury to brain. If face drawn to one side, probably apoplexy or compression of brain; if flushed and bloated, probably alcoholism. May detect odor of alcohol or opium on breath. Examine mouth and tongue; bite on tongue and froth in mouth indicate fits. Observe surface of body; very cold skin indicates fainting, collapse, freezing, severe shock, or intoxication; hot skin indicates great fever or sunstroke. Observe breathing; if slow, indicates shock or other depression; if stertorous, indicates opium poisoning or brain affection. Observe the pulse; if rapid, indicates sunstroke or fever; if slow, brain affection; if thready and rapid, indicates shock or some depressing effect. Raise successively each extremity and allow to drop; if falls lifelessly, suspect paralysis. If patient in convulsion, suspect hysterical, uræmic, epileptic or such convulsions. Examine body and extremities for fractures.

KIND OF COMA.	ETIOLOGY.	DEVELOPMENT. CHARACTER.	CONVULSIONS. PARALYSIS	RESPIRATION.	TEMPERATURE.	FACE.	PUPILS.	PULSE.	SKIN.	STOMACH AND BOWELS.	ODOR OF BREATH, ETC.	URINE.	TREATMENT.
Alcohol.	Alcoholism.	Delirium. Coma lasts for hours; gradually lessens. Aroused by ammonia or shaking, but is incoherent.	No convulsions. No paralysis.	"Steamboat." Stertorous. Heavy.	Low. Falls progressively from 1° to 6° below normal.	Flushed and swollen; may become pallid.	Dilated as a rule; but may be normal; insensible to light; conjunctiva congested.	Full and strong; later feeble. Is strong in Cannabis Indica.	First moist and warm, then cold.	Vomiting, usually.	Breath alcoholic. But alcohol may have caused ruptured cerebral blood vessels in other coma.	By analysis alcohol. Urine retained.	Apomorphine hypodermically. Empty stomach. Cold to head. Heat to extremities. Strychnine to support heart.
Belladonna.	Belladonna, etc.	Dryness of mouth and throat. Delirium precedes coma.		Slow and deep.	Frequently elevated.	Flushed.	Dilated.	Much increased.	Hot and dry.			Urine retained.	Emetics or wash out stomach; inject Pilocarpine and stimulants subcutaneously. Douches; Opium.
Chloral.	Chloral, etc.	Profound coma. Cannot be aroused.		Diminished, sighing or stertorous; then shallow and feeble.	As low as 94° F. or even 91° F.	Livid and bloated.	Contracted. Dilated when awake.	Slow, or very weak and quick. Later lost.	Very cold. Finally urticaria.				Emetic or pump; arouse; hot applications; coffee, strychnine; artificial respiration.
Hydrocyanic Acid.	Hydrocyanic acid, etc.	Profound coma.	Convulsions common.	Short inspiration. Prolonged expiration. Gasping, panting.			Dilated. Not reacting to light.	Imperceptible.	Cold, covered with clammy perspiration.		Odor of bitter almonds.		Stimulants; Ammonia inhalations. 1-50 grain Atropine hypodermically. Artificial respiration. Battery.
Opium.	Opium, etc.	Developed gradually. Aroused by noise, not by shaking. When aroused is coherent.	No paralysis.	First 8 to 10 per min., but deep; then 4 to 5 and long pauses. Shallow.		Suffused and red, then cyanotic; finally pale and livid.	Contracted. Insensible to light. As death approaches, dilate.	Strong. Slow and full till late in poisoning.	First dry, perhaps warm; later cold, clammy sweat.		Opium in breath.	Opium.	Wash stomach; one pint strong coffee into rectum; Battery; keep moving; Atropine subcutaneously; artificial respiration. Pot. Permang.
Asphyxia.	Exposure to gas or foul air.	Cannot be aroused.	May end in convulsions following distressed breathing.	Difficult owing to œdema of lungs.	Low.	Lips and tongue blue and discolored.		Small. Rapid. Weak.	Surface dry and hot.		Much CO or CO_2 in breath.		Fresh air; inhalation of oxygen; artificial respiration. If by CO transfuse blood.
Syncope (Cerebral Anæmia).	Shock, etc.	Coma develops suddenly, but is transient.		Weak but unembarrassed. Sighing.		Pale.		Absent at wrist.	Cold and perspiring.				Lower head; stimulants; smelling salts; cold water to face. Heat to body.
Congestive.—Insolation. Thermic fever. Sunstroke.	Exposure to heat or sun's rays.	Develops gradually. Coma yields readily to treatment.	No true paral. No coma. Collapse in heat exhaustion.	Shallow. May be noisy.	High. In heat exhaustion no fever.	Flushed. Pale.	Contracted or dilated.	Rapid. In heat exhaust'n, soft, feeble.	Congested. In heat exhaustion moist, cool, pale.	Involuntary diarrhœal discharges.		Passed involuntarily.	In heat stroke, cold to entire body, as by bath; cold enemeta; stimulants. In sunstroke cold to head, heat to body.
Apoplectic (Sine trauma.)	Apoplexy (as a rule the left side and old and fat people).	Suddenly developed. Profound stupor from beginning. No signs of injury. No oozing from nose or ears.	One side tossed, other side motionless. Hemiplegia.	Slow; stertorous.	Elevated particularly on side paralyzed.	Pale. May be drawn to one side. Bloated.	Dilated or unequal. Contracted if at Pons Varolii.	Small. Slow. Weak.	In head injury suspect cranial fracture.	Body emaciated. Fæces retained.	Breath sweet or may smell of alcohol, as acute alcoholism may have ruptured certain blood vessels.	Urine abundant; passed involuntarily; smells sweet.	Keep head elevated; reduce pressure in arteries; venesection if necessary; ice-bag to head; heat to extremities; purge; then alteratives.
Epileptic.	Epilepsy.	Cannot be aroused. Attack is short.	Follows convulsions.	Natural.	High.	Pale, or blue froth about mouth. Tongue bitten.		Nearly normal.			Odorless.		Protect body from cold or heat. Patiently wait for consciousness, protecting patient from bruises.
Diabetic.	Diabetes.	Develops slowly with sleepiness and great oppression. Patient cannot be aroused. Coma gradually deepens.	No convulsions. No true paralysis.	Rapid. May be noisy.	Usually normal. May go down to 90°.	Pale.	Regular.	Rapid. Weak.			Breath smells sweet, like pear or apple, or chloroform.	Chemical examination shows sugar. Large amount passed involuntarily.	Give inhalations of oxygen; intravenous injection of saline solution; opium if convulsions appear.
Uræmic.	Uræmia.	Begins with delirium or convulsions; coma complete.	Repeated convulsions, perhaps from first.	Deep; quick; stertorous.	Without convulsion is low, 91°-95°. With convulsion, high; may reach 108°.	Waxy.	Equal, size normal or dilated. Puffy eyelids.	Full, hard and strong, but not fast. Often only 40 to 50.		General œdema of body.	Urine odor about patient.	Albumen and casts; urine scanty and retained.	Uræmic coma not necessarily fatal. Pilocarpine hypodermically; Croton oil gtt. j. If plethoric venesection; chloroform inhalation; support heart. Remarkable recoveries.
Traumatic. (Cerebral. Meningeal.—Hemorrhage).	History of an injury. Patient may recover and relapse.	Signs of head injury. May be bloody or serous discharge. Is gradually increasing stupor.	Both sides may show paralysis, or one tossed.	Slow; stertorous. Lips inflated on one side on expiration.	Usually high.	Palsy. May be drawn to one side.	Pupils unequal	Apt to be strong and slow.	Hot or dry.				Early operation for removal of blood clot, and if necessary ligation of artery.
Hysterical. Trance. (2) Hypnotic. (3)	Hysteria. (Females mostly.) Consciousness suddenly lost. Hypnotized.	Developed suddenly. Coma alternates with hysterical delirium.		No stertor; may be weak.	Usually lowered.	(2) Expressionless. (3) Deathlike.	Natural. Sensitive to light.	Feeble, and frequent.	Flushed and hot. (2) Skin cold. (3) Limbs remain as placed.	No vomiting. No diarrhœa.	No odor.	Incontinence.	Cold applications. Give Arom. Spt. Ammon. (2) Watch; nourish. (3) Interrupt.

tions in which there is destruction of or serious damage to red blood corpuscles or other material change in the character of the blood.

Secondary anemia from such intoxications as those of arsenic, lead, mercury and other inorganic poisons, from such organic poisons as the toxins of various fevers, and from certain autogenous poisons produced by such chronic affections as jaundice, nephritis, etc., may be materially improved by direct transfusion.

Severe anemia, the result of a prolonged hemorrhage in hemophilia, is best relieved by a certain form of blood transfusion, i.e., by the introduction of blood through a needle inserted through the skin directly into a vein; the ordinary direct transfusion methods are unsafe in this condition, owing to the danger of fatal hemorrhage from the requisite incision.

In all of the transfusion methods a perfect asepsis should be maintained. The matter of the source of the blood in blood transfusion is important: the donor, the person giving the blood, shuld not be stout, nor over forty years of age, and free from disease. The Wassermann, hemolytic and agglutination tests* should be employed upon both donor and donee, unless the case is urgent. In both, the blood pressure, the blood count, the hemoglobin and the coagulation tests should be applied, the urine should be carefully analyzed and the pulse rate and the cardiac condition determined, all previous to the transfusion; the findings in these will influence the acceptance or the rejection of a prospective donor and serve as a guide in meeting the various needs of the donee. Fatal introduction of clot or of air into the blood sometimes occurs in blood transfusions, the result of faulty technic. The transfusion-valve method devised by Dr. George I. Miller, of Brooklyn, N. Y., seems to eliminate the probability if not the possibility of such occurrences; it is claimed that this method "will enable one to perform transfusion, after a little practice, with ease, accuracy and safety."

* If not of the same "group" as that of the patient it may prove ineffective if not actually harmful.

HINTS ON BRAIN AND HEART POISONS.

BRAIN.

There are three principal groups of poisons affecting the brain:

A. The Opium group, the predominant feature of which is the production of sleep.

B. The Belladonna group, which produces illusions and delirium.

C. The Alcohol group, which produces excitation and exhilaration, followed by delirium, and incoordination or sleep.

The Opium group causes dizziness, disturbed vision, ringing in the ears, contracted pupils (perhaps to a pin point and but slightly affected by light), headache, mental confusion, stupor.

Post Mortem find effusion of serum beneath membranes and into ventricles. Brain sinuses and veins filled with blood.

The Belladonna group causes indistinct vision, color-illusions and form-illusions, excitement, delirium, thirst and dryness of mouth, dilated pupils, perhaps convulsions, paralysis, coma. Among these are Belladonna, Stramonium, Hyoscin, Scopolamin, etc.

The Alcohol group causes rapid and forceful heart action, mental excitement and confusion, then diminished muscular action, disturbed coordination, hallucinations, weak pulse, double vision, stupor, coma. In chronic alcoholism commonly there is delirium tremens.

Post Mortem find brain and its membranes congested, and frequently indications of inflammation. The blood is unusually fluid and rigor mortis is persistent.

HEART.

Poisons acting on the heart cause death by producing more or less sudden shock, or depression, associated with faintness and collapse. To this group belong Oxalic Acid and the Oxalates, Aconite, certain coal-tar products, Hydrocyanic Acid, the cyanides of Potassium and Mercury, Digitalis, Cocain, etc.

PART X*a*

FEEDING IN POISONING.

Various Recuperative Measures in Debility

When a person is poisoned it is important that he be given only such foods as are strictly suitable. Certain foods are harmful in certain poisonings. In some poisonings no food should be given by mouth, if at all, for some time; and it may be necessary to observe some food restrictions until complete recovery occurs.

The menace to health and to life is serious enough ordinarily, in a severe poisoning, to demand one's best efforts, without having also to contend against the damaging, perhaps destructive, effects of unsuited foods being given. The food supplied should be supportive and reconstructive, energy-producing and tissue-building, fortifying against the shock and other serious effects of the poisoning—not an added evil, perhaps even an insurmountable, crushing handicap. If the mother of a nursing baby be poisoned, it may be necessary to discontinue giving the baby her breast milk for a time at least; such conditions as the following demand such action: If the mother be so severely affected by the poison as to make the nursing too great a tax upon her vitality, or, as to seriously disturb the baby's digestion, or to otherwise injuriously affect it, or even to menace its well being; also, although the mother does not yet evidence serious effects from the poison taken, if the poison be one of those known to be excreted through the breast milk and the dose taken be large enough to be deemed dangerous, the feeding of the mother's milk to the baby should

be promptly suspended. In suspending the feeding of the breast-milk of the mother, or in providing for a deficiency in its quantity or quality, resort must be had to the milk of a wet nurse, or to some kind of artificial feeding, such as a modified cow's milk, or to some other substitute for human milk. Suitable adaptation of the artificial feeding, as of cow's milk, to a baby, is a very difficult matter; and it is considered by many physicians the greatest problem in medical practice, inasmuch as there is no true substitute for the milk of the human mother, and each mother and her baby commonly have their associated peculiarities.

Babies differ greatly at the same age, in condition as well as in adaptability to formulæ of cow's milk, etc.; they differ also in sensitiveness to the various sugars, cereals, vegetable and animal proteins, fruit juices, etc. Consequently authorities differ more or less widely as to what constitute suitable formulæ for the feeding of cow's milk to infants (by bottle or otherwise) at the various ages; also as to what auxiliary foods—such as cereals, toast, crackers, bread, vegetables or their juices (potato, carrot, spinach, pea, asparagus tips, etc.), egg, etc.—may best be given, and at what age the feeding of them may wisely be inaugurated.

Because of the difficulties commonly encountered in providing suitable bottle-feedings, and other kinds of food for babies, the author has incorporated in this chapter suggestions on such feedings and foods. It may be of interest to know that these suggestions are based upon his personal experience in 38 years of medical practice, his advisory service at Baby Health Stations of the Bureau of Child Hygiene of the Department of Health of the City of New York, his nursery service, and upon a review, by him, of the opinions and the methods, in such matters, of many of the leading American experts on infant feeding and the care and treatment of children. (See section on Infant Feeding.)

Feeding in Shock from Poisoning.—If not prohibited by the condition of some part of the alimentary canal—as of the stomach, from the severe effects of a highly irritant or corrosive poison, or of the stomach or intestine or both from an existing highly fermentative or putrefactive condition, or if not prevented by local or other blood conditions—such foods as the following may well be given by mouth; Milk; fluid, highly nutritious broths; strong meat soup (consommé); or albumin water; gruels; coffee, tea, cocoa or other beverages (hot), or stimulants; etc. When not proper by mouth, such foods may be given as nutrient enemata, when suitably prepared. (See Feeding (Rectal) in Rabies.)

Feeding in Acute Gastritis (Especially that caused by an irritant or corrosive poison).—If there be corrosion or severe irritation of the upper part of the alimentary canal do not feed by mouth—it is not likely to digest but to irritate and to poison more instead. No food should be given by mouth for a day or two except possibly diluted or peptonized milk. Then weak tea, albumin, strained rice, barley, or oatmeal water; thin, milk and egg custard. If readily taken, feed by nutrient enemata as outlined in section on Feeding in Poisoning by Rabic Virus. Milk and water with soft bread in it. When the severe symptoms are much reduced, give with or without soft bread in it; try some yolk of egg, barley or oatmeal gruel, rice soup, soft egg, raw oysters, soft egg, gruel, zwieback, farina, oatmeal, custard, krumbles, cornflakes, etc., given gradually more and more as acute condition subsides.

Drink freely of water. Saline and aperient waters maye be well borne, try them cautiously, except in poisoning by mercury or in a nephritis or edema.

Feeding in Poisoning by Rabic Virus.—During the early symptoms of rabic poisoning, soft, semi-fluid food may be quite readily taken—such food as a thick soup of chicken, lamb, mutton, beef or a broth from a concentrated meat extract; also milk with or without

a cereal, custard, jellies, jello, etc., or a malt extract. If swallowing is painful or difficult, it may be necessary to apply a 4 per cent cocain, procain, or similar local anesthetic solution to the throat to facilitate the process; if swallowing still be difficult or cause severe general convulsions, it may be necessary to give inhalations of chloroform to the extent of a primary anesthesia, or even to feed by stomach tube or catheter introduced into the stomach, with or without anesthesia. If rigidity of the jaws should interfere with the introduction of the tube or catheter and a front or side tooth be absent, a soft catheter may be passed through such opening, aided by swallowing motions, or by a weak local anesthetic spray; or the tube may be passed through the nostril if necessary. Through the catheter, with small funnel connected, thin, fluid foods of the same general character may be given. In feeding by catheter larger quantities of food may be given usually, but at longer intervals, even a pint of thin gruel, predigested milk, panopeptone, liquid peptonoids, soup or broth, etc.

When it seems necessary to resort to rectal feeding the rectum should be well cleansed before introducing the food. Flush it with at least a quart of warm soapsuds (castile or ivory soap) with half a level teaspoonful of table salt to the pint of fluid, or twice as much bicarbonate of soda and salt to the quart. The patient should be on the left side with the hips on a pillow and the shoulder low. If there be much mucus or the rectum prove irritable, put in one-half to one teaspoonful of saturated solution of boric acid to the quart of flushing fluid. The rectal alimentation (nutrient enema) should be given through a rectal tube or through a flexible depressed-eye or "velvet-eyed," long, rubber catheter (size 12 to 14 for a child; No. 15 to 23 for an adult.) The tube should not be so flexible as to bend easily, nor to double back upon itself after insertion, nor so stiff as to damage the rectal wall should it catch in a fold of it. It should be dipped in warmed vaseline or in sweet oil and gently inserted to the

sigmoid flexure, about 3 to 10 inches for children, according to age and size, and 12 to 24 inches for adults. It is important that the tube should be carried well up the rectal canal that the nutrient material may be retained more easily, and that it cover considerable absorbing surface; also, that, being delivered in the upper part of the rectum, it be taken up by tributaries of the portal vein and thus be carried directly to the liver for the highly important assimilative processes which occur there; whereas, if the nutrient material be delivered at the lower part of the rectum and absorbed there, it is diverted from the course to the liver and goes directly to the heart through the vena cava. A glass or hard rubber funnel or a percolator-like wall-tank or can, large enough to readily contain all of the food at one time, if desired, should be attached to the tube inserted into the rectum. It is better than a fountain syringe and than one with a piston. The whole apparatus should be so managed that no air enters the bowel with the nutrient enemia. A little of the fluid should be allowed to run from the tip of the tube, (after filling it, and a part of the funnel, with the fluid), in order to exclude all air from the tube, which should then be pinched tightly, low down, and inserted. That which flows out may be poured into the funnel so as not to be wasted. For a young baby the tube should be inserted 3 to 4 inches; for an older child, 6 to 10 inches, ordinarily for an adult about 18 inches. The funnel bottom should be held only 4 to 8 inches above the rectum for a baby, 6 to 10 inches for an older child and ¾ to 2 feet for an adult. In introducing the nutrient enema or food, the patient should lie on the left side, (or in Sim's position) with knees drawn up, and the hip on a pillow; the left shoulder should be low but the head may be on a low pillow. Valuable aid in the retention may be had, by applying and pressing a wad of cotton or clean waste or several folds of gauze about the size of a walnut, against the anus, and then holding it there 20 or 30 minutes, or applying a towel or napkin

like a baby's napkin. By turning the patient on the back or upon the right side, as soon as all of the fluid has been introduced, and keeping in that position for a time, retention is favored. It may be necessary to elevate the hips or hip a little more. Quietly diverting the patient's mind from the stress of retention to interesting, not too amusing, matters, may help.

In case of great rectal intolerance, inject into the rectum by means of a small syringe, 5 to 10 drops of Tincture of Opium or of Tincture of Belladonna in half a teaspoonful or more of water, one-half to one hour before the nutrient enema is given. It should not be used when avoidable, as, although it encourages retention by soothing the nerves and reducing peristalsis, and also helps prevent general convulsions, there is a tendency to depend upon it too much, and it also tends to interfere with the absorption of the nutrient material. Although the nutrient enemata may be retained with great difficulty the first few times used, or for the first few days, or even rejected, as a rule, by persisting with them, they are soon quite well borne. When an intolerance to the enemata develops after quite a period of successful use, a period of rest from such injections, lasting one or two days if necessary, often will restore local tone and tolerance. It has been found that patients may be nourished quite well, even six or seven weeks, by the judicious employment of this nutrition method, without causing a mucus diarrhoea or severe or protracted local disturbance.

Nutrient Enemata.—As enemata, only such starches as have been predigested and converted into dextrin and maltose or glucose, are likely to be absorbed, even in small quantity. Fats and oils, usually, mechanically interfere with absorption, by acting as an envelope surrounding the absorbable foods, or by coating over the absorbing surface. Even when emulsified, saponified or otherwise prepared they appear to be of doubtful utility. Food which is not readily absorbed is apt to irritate the rectal wall as it is nature's inclination there to remove waste or that which

irritates. Proteins which have been more or less completely predigested or pancreatinized, are more absorbable than those which have not, but they must be well diluted.

Pancreatin or pancreatic extract, or pepsin, may be used in the preparation of beef juice or of milk for absorption, but the pepsin is less satisfactory. A good way to procure the beef juice is by using a meat squeezer upon a round steak which is without fat and cut thick; the meat should be seasoned with pepper and salt, broiled over a lively fire, cut into two inch squares, and squeezed well. This furnishes about half a pint of juice for each pound of meat used. Although the juice is better when freshly expressed, when cold it may be re-warmed by putting its container in hot water. It may be pancreatinized in the same way as milk. Milk may be pancreatinized by adding a pint of fresh milk to four ounces of cold water; to this add a tubeful of Fairchild's Peptonizing Powder (pancreactic extract 5 grains and sodium bicarbonate, 15 grains) or one to two teaspoonfuls of Parke Davis & Co.'s Pancreatic Solution; then stir well. Stand the mixture in warm (not hot) water for half an hour. Then boil the mixture two or three minutes to stop further digestive processes; if the boiling be postponed much longer than 30 minutes the protein will be completely digested—(while not objectionable in peptonizing for rectal use, it would be for oral administration as it makes the mixture more or less intensely bitter). After being thus prepared, the mixture may well be kept on ice for 6 to 12 hours.

A mixture of 2 ounces each of beef juice and of milk, both pancreatinized, or 4 ounces of pancreatinized milk and the whites of two eggs, either raw or pancreatinized, and 2 level teaspoonfuls of milk sugar, has proved very serviceable as favored by Dr. W. G. Thompson. Also, a mixture of peptonized milk, one-half pint, 1 or 2 level tablespoonfuls of milk sugar, or of dextrimaltose, and the whites of 1 or 2 eggs, raw or pancreatinized, and 1 tablespoonful of malted

milk makes a good mixture. (Yolk of egg contains too much fat to be useful, usually, for such enema.)

Bovinine, after being pancreatized like milk, may be found serviceable as a temporary substitute for the foregoing; freshly prepared, nutrient enemata, if given per rectum in one ounce doses; Panopeptone (predigested wheat starch and beef), and Liquid Peptonoids are predigested preparations which may be similarly used. Valentine's Meat Juice—one ounce said to represent the condensed essence of nine ounces of natural expressed beef juice, and to contain hemaglobin and some albumin—is quite often given by mouth in one-half to 2 teaspoonful doses in 1 to 4 tablespoonfuls of cold water, wine or cold or warm tea; it may also be given per rectum; so may also other, somewhat similar, meat preparations. It may be necessary to considerably dilute them. They should be introduced warm but should not be boiled.

Another satisfactory mixture is made by beating up the whites of 2 eggs and mixing in ½ pint of milk; warm to 100 degrees F. and add the contents of a Fairchild's peptonizing tube. Stand the mixture in a warm place for an hour then place on ice. A portion of this may be used as required, with or without 1 ounce of starch, strained oatmeal, barley or flour gruel, to each 4 or 6 ounces of it, as desired. In some conditions 1 or 2 tablespoonfulls of whisky is added, as in a severe debility or slow convalescence, but such is not suitable in rabies.

Malted milk (3 or 4 heaping teaspoonfuls of the powder in 6 to 8 ounces of water), adding ½ level teaspoonful of salt and the white of one egg if desired, is also used.

By adding 5 grams of pancreation and the same amount of sodium bicarbonate to 8 ounces of a thick well cooked gruel of oatmeal, cornmeal, barley, arrow root or other farinaceous substance and keeping the mixture at 100°F. for about 10 minutes it becomes pancreatinized. By this process the gruel has been

thinned and made more digestible, the starch having been converted into dextrin and a sugar.

If malt flour (commonly, barley soaked well heated, allowed to germinate, dried and ground) one part, and oatmeal 6 or 8 parts, be made into a thin porridge, it is a conveinent nourishing food for mouth or rectal administration.

Maltine (made from wheat, oats and barley) is rich in the vegetable digestant or ferment known as diastase. It may be used alone or in raw peptonized milk; or it may be added to an equal part of well boiled wheat flour or barley flour, which it partly digests, and used thus as a convenient food, or added to milk to dilute the latter.

Various malt extracts and malt preparations are serviceable foods.

Mellin's Food contains (wheat, flour and malt). It is dextrinized and quite rich in sugar, but not in fat. It is readily added to milk and hot water as a temporary or auxiliary food by mouth or rectum.

Malted Milk is a preparation of milk with malted barley and wheat extracts whose starch has been changed into dextrin. It resembles Mellin's Food, but also is of rather low fat content. It is particularly serviceable in severe alimentary disturbances and often may be used satisfactorily for a time as a substitute for breast milk in infant feeding.

Feeding, in Poisoning by Mercury.—Take milk, more or less diluted. Gruels, thin well-done toast, soft puddings (without eggs); all vegetables except peas, beans, raddishes, cabbages. Drink water, postum. Avoid tea and coffee. In convalescence, cautiously clear broths. Fruits not very sour. Feeding by nutrient enemato may be necessary. (See under feeding in poisoning by rabic virus).

Feeding, in Acute Gastritis.—In a gastritis resulting from the action of an irritant or corrosive poison, no feeding by mouth may be possible for some time—rectal feeding only. (See nutrient enemata, under feeding in poisoning by rabic virus).

When feeding by the mouth can be employed, strained barley water, rice water, albumin water, milk and water, bread and water (warm), the various gruels as improvement ensues; also soft egg, gradually add bread and butter, raw oysters, thickened but simple broths and soup. Dry cereals plain vebetables, tea and coffee, peptonized foods.

Feeding in Debility.—Give by mouth rich cream soups—chicken, lamb, clam or beef broth, with or without chopped meat or cereal thickening; fresh fish (boiled or broiled), broiled or crisp bacon, boiled tender ham, chicken, mutton or beef, lamb chops or cutlets, as able: tender, juicy steaks or chipped beef or hamburger steak to chew; coddled (8 minutes in standing, boiling hot water, or put on in cold water and boiled 2 minutes), shirred, poached or other soft cooked egg; crisp toast, with or without butter, milk or cream; cornbread, graham bread or malted bread, triskets, gluten bread, shredded wheat, graham, Wheatsworth or other dry crackers or biscuits with or without butter; also other crackers or biscuits and rolls that may agree and appeal to taste; also tapioca, rice and other cereals as corn flakes, krumbles, corn and oat meal, cream of wheat, wheatena, etc., as agree.

Strictly fresh and well cooked vegetables that agree; custards, corn starch and bread puddings, junkets, calf's foot jelly, gelatine, cooked (not very acid nor sweet) fruits, especially apples, prunes, peaches, pears, apricots, figs and dates. As drinks: water, malted milk, tea or coffee, Phillips or Epps cocoa, perhaps others and chocolate; albuminous drinks panopepton, hot or cold milk (easier digested if diluted, or better if peptonized; diluted (peptonize judiciously) unfermented grape juice or orange juice. Avoid most other foods and drinks until quite convalesced.

Insomnia or sleeplessness, so often a disturbing element in debility, may often be helped by a glass of hot (somewhat diluted) milk or malted milk, taken shortly before retiring. When able, a short walk at

bed time, or light calesthenic exercise, may help. Sleeping out of doors favors sleep, if not afraid. Take a hot sponge or tub bath, with cold, wet cloth on head, and followed by application of cool or cold water and brisk rubbing; then at once to bed, with head high, comfortable garb and bed clothing; wet, cold cloth to head, and heat to feet if weather not too warm; then by relaxing and composing mind, sleep is encouraged or induced without drugs.

Feeding in Intestinal Auto-intoxication, Alimentary Toxemia; Auto-intoxication, Auto-toxemia-(Not true ptomain poisoning, nor spoiled, putrefied, etc., meat, fish or milk, etc., poisoning).—In poisoning by toxins produced within the body, and while still active, diffused through the circulation, instead of being directly removed in the excreta or neutralized before being absorbed, the digestive and food absorptive functions are more or less seriously interfered with. Consequently the vital force so dependent upon these functions for its maintenance, is immediately menaced. Pending removal or destruction of the toxins, or suspension of their production and of their toxic effects, the tax upon these functions must be reduced to a minimum. Therefore, foods which have been predigested and are highly absorbable and nutritious, and not contributory to the toxin nor toxic processes, are desirable. (See Pancreatinizing under Nutrient Enemata.)

In the light of present knowledge and commonly accepted chemical and other determinations and interpretations it seems best to reserve the term Food-Poisoning for those poisonings resulting from the ingestion of foods already in a state of decomposition or in some way poisoned or poisonous before being taken as food. Although ptomain poisoning, so-called, commonly is included in this definition, doubtless such poisoning may be the result of an intestinal putrefactive process, originating in the alimentary canal, and producing an auto-intoxication and toxemia strictly alimentary in its

origin; hence an intestinal auto-intoxication, rather than a true food poisoning, or poisoning by food unfit for ordinary human consumption before it was ingested. In the food-poisoning class would be placed meat, fish, milk, etc., whose proteins were in an unfit condition, or of a deleterious character before they were ingested.

Feeding in Fermentation Auto-intoxication.—When a severe fermentative condition or the effects of such exists in some part of the alimentary canal, carbohydrates—starches, sugars, all sweets and their products, are to be avoided or taken very sparingly. Diluted or pasteurized milk, custard, soft egg, clear broth and various meat juices—hot and free from grease and preferably, pasteurized—and plain carrots, asparagus, string beans, celery, etc., may be given cautiously when well borne, albumin water helps. drink water freely, or sip hot water or hot weak tea. Eat but little butter. Try some yellow corn meal, fish, chicken broths, eggs, chopped or scraped beef, boiled ham (sliced very thin), chipped or smoked beef (to be well chewed and residue discarded); oysters (raw, stewed or steamed). Trisket, slowly toasted wholewheat bread; shredded wheat biscuit, hominy tapioca, asparagus tips, small peas or string beans, or stringless string beans, cooked celery, spinach, squash, okra, lettuce, parsnips, etc. Roast beef or steak, veal, mutton chop (very tender); thin crisp fried bacon; lamb or beef tongue, boiled or roast, tender, not fat ham; cautiously; stewed fruit, jello or gelatine, custard. Also oranges, prunes, bananas, apples, peaches, pears, plums and olives. Buttermilk, but little butter. Tea or coffee with a saccharin tablet instead of sugar (no cream); skimmed milk and water. Aperient waters and much water between meals, alone if but little atony or loss of tone in bowels.

Feeding in Putrefaction Auto-intoxication.—When a severe putrefactive condition, or the effects of such, exists in some part of the alimentary canal, proteins, both animal and vegetable, are to be avoided or

to be eaten very sparingly at least. Carbohydrates may be given cautiously when well borne. Milk, diluted or pasteurized, such dry cereals as corn flakes, krumbles, puffed rice, well toasted bread, corn muffins, shredded wheat biscuits, triskets, graham and arrow root crackers, etc. Vegetable soups; strained thin meat-soups (cautiously, late in convalescence); asparagus; corn, lima, butter and string beans; small tender peas; perhaps small onions boiled; small tender beets; lettuce, celery, spinach, pumpkin, squash, parsnip, tomato, potato, egg plant, etc. Bacon—crisp snappy (as convalescence progresses); boiled or broiled fish—as weak fish, whiting, flounder, bass, trout—once or twice a week only. Most of the cereals—tapioca, sago, macaroni and spaghetti—no cheese, rice, cornmeal, oatmeal, graham or whole-wheat bread or crackers (crisp) —butter very sparingly, (about ½ ounce daily). Fresh fruit (raw and cooked); no sugar or cocoa until late in convalescence. Drink water freely and aperient waters; tea, coffee or cocoa (sparingly; skimmed milk and water—not other milk foods and early tender, small peas, string beans, asparagus, cooked celery, lettuce, tomatoes; strained vegetables soups without potato; perhaps a few very crisp potato chips. Crisp zwieback, or whole wheat bread slowly toasted and made snappy; then wet with hot water if with—(no butter); shredded wheat biscuit trisket graham crackers (unsweetened preferred), arrow-root or wheatworth crackers, aerated bread— (soft bread, charged with CO_2;). Boiled ham (in latter part of convalescence cautiously); crisp bacon; broiled or boiled lean chicken; fresh weakfish, whitefish, butterfish or flounder—eat chicken and fish occasionally, sparingly and very cautiously—mainly in latter part of convalescence. Only ½ ounce of butter daily if at all. Drink water freely, also orange juice with water; black coffee with one 2-grain saccharin tablet (no sugar); weak black tea with thin slice of lemon. No alcoholics nor ferments.

In feeding in many or all of the auto-intoxications and in food poisonings, even in quite advanced con-

valescence, only plain foods should be eaten; rich highly-seasoned or irritant foods are quite unsuited to due recovery processes. One should avoid trying to eat a large quantity or great variety of food, eat perhaps a little oftener but considerably less each time than formerly. Drink water freely, saline waters and the true aperients often are beneficial. Each case has its mandatory peculiarities, and these will rule and must be the real guide, with due observance of variety of foods and sufficient of food calories in feeding.

Feeding in Food Poisonings.—Feed practically on the basis of Putrefaction-Auto-intoxication, modifying as indications arise.

In treating any toxemia, or form of blood poisoning, the functional activity of the liver should be very carefully maintained to insure the benefits of its bactericidal and eliminative action.

INFANT FEEDING

If the mother of a nursing baby be poisoned suddenly, or a poisoned condition of her blood develop, it may be necessary to provide a wet-nurse for the baby or to resort to artificial feeding of it. In either case the frequency in feeding, the duration of each feeding, and the general principles to be observed are the same as in nursings by the mother.

In selecting a wet-nurse it is desirable to secure one between twenty and thirty years of age, and who has had more than one child (because of the advantage of experience in the suckling and the general care of such), and whose nursing baby is about the same age as the one to be wet-nursed; however, the wet-nurse whose baby is less than six months old can, as a rule, properly suckle one at any age under that, although less difference between the ages is desirable. Usually a change from one wet-nurse to another is not harmful to a baby, and sometimes several wet nurses must be tried before one is found whose breast milk agrees. A woman of good development, rather broad-shouldered, of a gentle and happy disposition, rather than one who is temperamental, nervous, hysterical or neurasthenic, is much to be preferred; the character of the milk secreted may be considerably influenced by a nervous instability. The breasts of the wet-nurse in prospect should be examined to determine the quantity of milk present.

By light, but firm, manipulation of the breasts, well behind the nipples, using both hands on one breast at a time, the size and functional activity of their glands may be determined. By firmly but gently taking hold of one breast with both hands well behind the nipples, and expressing outward (as in emptying an infant syringe with one hand) the quantity and freedom of flow of the milk may be determined; it should spurt out with considerable force and in several streams, if the pressure is maintained for about half a minute. If it be difficult to express it without much massaging or pumping of the breast, such wet-nurse is ill-suited to the nursing of a premature, marasmic, or otherwise enfeebled or ill-nourished baby. Such babies require a plentiful supply of milk, the milk flowing without much sucking effort. In the normal breast a manual expressing should not cause pain. Drawing the milk by a thumb and finger explusion process or by a stripping process, to feed the baby or to relieve the breast of over supply, is favored by some, and others use a breast pump.

The lungs of the wet-nurse should be examined to determine that she is free from tuberculosis; the skin and throat examined and the blood tested by the Wasserman test, to determine she is free from syphilis; her eyes examined to be sure she has no trachoma; her nipples inspected to determine the absence of fissures, also that they are sufficiently prominent to insure a good seizure in the nursing. The vagmal and urethral secretions should be tested to determine the absence of gonorrhea and of puss cells. By exercising these precautions the baby should be quite well protected against a blood poisoning or infection by the wet-nurse.

The baby of the wet-nurse should be inspected to determine that it is well nourished by the mother, and appears to be free from conveyable disease. Also that the milk of the mother seems to be sufficient to supply both babies adequately. If the wet-nurse does not directly nurse the alien or wet-nurse baby, but sends her milk to be taken from a bottle or spoon, determine that her milk is or will be properly drawn, received in a clean container, carried and kept for the purpose. The milk for the alien baby should be expressed first from one of the wet-nurse's breasts, then her own baby should empty that breast and draw some from the other breast it necessary. At the next feeding the same course should be pursued beginning with the breast only partly emptied. If the milk of the wet-nurse is to be sent to the alien baby, it should be put on ice when received until time to feed, then warmed to blood heat and given.

The writer has been much gratified by results obtained in his Health Stations' work by following some of the methods advised by the celebrated Dr. L. Emmett Holt of New York. Some of his points are worthy of emphasis, such as:

"A simple method of calculating a milk formula for an average healthy infant on the basis of caloric requirements is to start with the daily amount of protein of cow's milk needed. This by experience has been found to be furnished in approxi-

FORMULAS FROM WHOLE (4 PER CENT) MILK

Giving Approximate Percentage Composition and Calories Value

	I	II	III	IV	V	VI	VII	VIII	IX	X
Milk (ounces)	6	7	8	9	10	11	12	13	14	15
Water (ounces)	14	13	12	11	10	9	7	5	1	0
Gruel* (ounces)	.....	.....	.....	.....	.....	.....	1	2	5	5
Sugar† (even tablespoonfuls)	2½	2½	2½	2½	2½	2½	2	1½	1	1
Total	20	20	20	20	20	20	20	20	20	20
Fat (per cent)	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00
Sugar (per cent)	5.70	6.00	6.00	6.50	6.50	6.50	6.00	5.50	5.50	5.00
Starch (per cent)	.....	.....	.....	.....	.....	.....	.40	.80	2.00	2.00
Protein per cent)	1.00	1.20	1.40	1.60	1.75	1.90	2.10	2.25	2.40	2.60
Calories (per oz.))	11.5	12.5	13.5	14.5	15.5	16.5	17.0	18.0	20.0	21.0
Approx. age indication.	2 dys.	1 wk.	2 wks.	2 mos.	3 mos.	4 mos.	5 mos.	6 mos.	8 mos.	9-11 mos.

*The gruel here indicated is made in the proportion of 1 oz. of flour by volume to 10 oz. of water.

†Milk sugar is here indicated; of cane sugar use two scant tablespoonfuls instead of two and a half, and one instead of one and a half, etc. Maltose may be used in the same amounts as milk sugar.

mately 1½ ounces of milk for each pound of body weight. An infant weighing 10 pounds will thus require 15 ounces of milk. If his caloric needs be calculated at 45 per pound they will be 450 calories. Of this there will be furnished in the milk (20 calories per ounce) 300 calories, leaving 150 to be made up by carbohydrates—sugar or starch. One ounce of sugar will add 120 calories; or 1¼ ounces, 150 calories. This will give the food value for a day. There is still to be determined the amount of diluent which will depend upon the infant's daily need of fluid. This has been shown to be about 3 ounces for each pound of body weight in the early months, and 2 ounces for each pound in the later months; i. e., for a 10-pound infant it will be 30 ounces a day. There will need to be added, therefore, 15 ounces of water. The formula will then be:

15 ounces milk, giving 300 calories
1¼ " sugar, giving 150 calories
15 " water

The 30 ounces of food could be divided into seven feedings of 4¼ ounces each, or into five feedings of 6 ounces each according to circumstances. The approximate percentage composition of the formula, using 4 per cent. milk, would be: fat, 2.00; sugar, 6.00; protein, 1.75.

Before this top-milk is removed the milk should stand in the bottle at least 4 hours, and the top-milk should be carefully removed with a milk dipper, not poured off."

SCHEDULE FOR HEALTHY INFANTS DURING THE FIRST YEAR

Age	Interval Between Feedings	Night Feedings after 6 p.m.	Feedings in 24 Hours	Quantity for one Feeding Ounces	Quantity for 24 Hours Ounces
2nd to 7th day....	3	2	7	1 –2	7 –14
2nd, 3rd and 4th weeks	3	2	7	2½–4½	18 –32
2nd and 3rd months	3	2	7	3½–5	24 –35
4th and 5th months	4	1	5	6 –7	30 –35
6th, 7th and 8th months	4	1	5	6½–7½	32½–37½
9th and 10th months	4	1	5	7 –8	35 –40
11th and 12th months	4	1	5	8 –9	40 –45

"A schedule like the following indicates the needs of a healthy infant of average size, weight and activity. But no schedule can be closely followed with any given child. One cannot conclude because an infant is six weeks old he is able to digest a certain amount of food and a certain other amount because he is six months old. To attempt to follow any schedule too closely is to violate the fundamental principle of intelligent

feeding, which is to adapt the food to the child's requirements and powers of digestion at the time. Because these figures represent averages they form a useful basis for feeding healthy children.

Age	Average Caloric Requirements	Furnished in
1 month	400	7 feedings 4¼ oz. of No. III
2 months	500	7 feedings 4¾ oz. of No. IV
3 months	560	5 feedings 7 oz. of No. V
6 months	640	5 feedings 7½ oz. of No. VIII
9 months	740	5 feedings 7¾ oz. of No. IX

How and Where to Begin—With all young infants, even those having presumably normal digestion, it is desirable to begin with a weaker food than would be indicated by their caloric requirements, and gradually increase both the strength and quantity according to the child's digestion. With small or feeble infants still weaker formulas should be used and the increase made more slowly.

For a healthy child with normal digestion who has previously had no cow's milk one should begin with a lower formula than would usually be given to a healthy child of his size and age, but may increase the strength and quantity of the food more rapidly than with a stronger infant.

A stationary weight for a week or two, or even a loss of a few ounces, is of no importance, provided the change in diet can be effected without disturbing digestion; for as soon as a child becomes accustomed to cow's milk the strength can be increased and progress is assured. Nothing is easier than to disturb the digestion in the beginning by the use of too strong food."

Prof. Roger H. Dennett, Professor of Diseases of Children and Director of the Department in the New York Post Graduate Medical School, etc., in treating on the bottle feeding of babies, in his books, very properly calls it "the intricate subject of infant feeding." He further says: "Infant feeding is a science, not guess work;" and that "experimentation may prove disastrous." "Physicians of large experience will readily subscribe to these sentiments.

The writer has found Dr. Dennett's methods and personal suggestions, and the methods of Dr. Louis Fitscher, of the Willard Parker, Riverside and other hospitals of New York

City, of great service in his private practice and advising mothers and directing the feeding of very many babies, in the writer's clinical service in the Bureau of Child Hygiene of the Department of Health of the City of New York, etc. He has also found the practical ideas of Dr. S. Josephine Baker, Director of the Bureau of Child Hygiene of the Department of Health of the City of New York, very helpful.

CALORIES

Dr. Dennett claims regarding the requirements of bottle-fed infants that:

The fat infant over four months of age needs forty to fifty calories per pound per day. The moderately thin infant over four months of age or the average infant under four months needs fifty to fifty-five calories per pound per day.

The emaciated infant of any age needs sixty to sixty-five calories per pound per day.

STOMACH CAPACITY

At birth, 1 ounce.
At 1 month, 2½ ounces.
At 2 months, 3½ ounces.
At 3 months, 4 to 4½ ounces.
At 5 months, 5½ ounces.
At 6 months, 6 ounces.
At 9 months, 7½ ounces.
At 1 year, 9 ounces.

If the baby is quiet, usually (crying only about feeding time), gains steadily and proportionately in weight, with well digested stools and no vomiting, or but little (and that not sour) the food is agreeing with it. If there be a little vomiting immediately or very shortly after feeding it is probable the quantity given is too great, or the baby nurses too fast. The quantity given should be reduced; or the food given for about 5 minutes, and then a 5 minutes' interval introduced during which the baby should be placed with the face over the shoulder and gently patted to belch up any gas present in the stomach; then the food given again for 10 or 15 minutes with or without another adjusting interval. The milk mixture is made more digestible by heating for 2 or 3 minutes.

Boil the milk or rather bringing it to a boil and then by reducing the heat (such as turning gas low), allowing it to merely simmer for 3 minutes. Moving it from over the fire and stirring it for 5 minutes, thus preventing a scum forming. Small soft curds being formed instead of large hard ones and vomiting often prevented by feeding the milk thus:

Dr. Dennett gives the following approximate analysis of

Dryco (a dry milk which serves well as a temporary food in malnutrition, indigestion, etc.):

At first it should usually be fed ¼ to ½ strength only, at first.

1 ounce by weight = 127 calories.

8 level tablespoonfuls = 1 ounce.

1 level tablespoonful = 16 calories.

	Per Cent
Fat	12
Lactose	44
Protein	34
Salts	7
Moisture	3
Given 1 part to 8 by weight	100

With the larger quantities of dry milk the urine is apt to become ammoniacal and by increasing the calories with starch and sugar this excessive output in the urine can be avoided.

Dr. Dennett declares that during the process of drying the milk is important the change which takes place in the case. The heat and the loss of water separates almost instantaneously the casein into minute particles which remain suspended in this finely divided state when water is later added for feeding purposes. In the stomach these separate particles do not unite to form large masses or curds such as are found when fresh cow's milk is acted upon by the gastric juice. He states also that these separate particles, although they become swollen, do not unite to from large masses or curds, such as are found when fresh cow's milk is acted upon by the gastric juice and are more easily digested in stomach and in the intestines and are digested much more readily than the large curds of fresh cow's milk or even the small curds of boiled milk. The analysis stated by Dr. Dennett also shows to what he calls attention, i. e., that the Dryco contains a low fat and a larger per cent of free fatty acid than does fresh cow's milk; and that: "These fatty acids react with the alkaline carbonates to form soaps and the soaps in turn form an emulsion which assists in the digestion of the fats. He calls attention to the fact that when the Dryco is used alone mixed with water 1 part to 8 by weight (one level tablespoonful to one ounce of water) it gives a mixture containing about 5½ per cent lactose, 1½ per cent fat and a little over 4 per cent protein; and, that "This high protein content makes it advisable to add sugar or gruels or both to the feedings of older infants, after the digestive disturbances have been controlled, but not usually until 4 or 5 ounces (30 to 40) tablespoonfuls of the dry milk product are consumed daily."

Dr. Dennett says: "The food must be made fresh at each feeding by dissolving the proper quantity of the dry milk powder in the proper quantity of hot water. In order to furnish 50 calories per pound per day give 3 tablespoonfuls, leveled with a knife, of dry milk for every pound of the body weight, since a tablespoonful has 16 calories. Only very poorly nourished infants need as many as 50 calories per pound of dry milk. Well-nourished or fat babies gain progressively on 40 calories per pound per day (or ever less) which can be furnished in 2½ tablespoonfuls for each pound of the body weight.

The maximum strength of the food is one tablespoonful to the ounce of water, weaker solutions always being used at first. Begin with one tablespoonful (⅛ of an ounce by weight) in 2 to 4 ounces of water, according to the age and size of the infant. In 24 hours 2 tablespoonfuls to each feeding may be used and a day or two later 3 tablespoonfuls, and so on until the caloric requirements are fulfilled. An infant of average size and weight may have at each feeding one or two more ounces of food than the number of months of its age, with a minimum quantity of 3 ounces and a maximum of eight ounces. Undersized or vomiting infants must have less."

"Begin orange juice in all kinds of bottle feedings at 6 weeks old to eliminate possibility of scurvy."—Dr. Dennet. "Therefore, all of my cases are put on orange juice after 2 or 3 weeks." He begins on cases of simple intestinal indigestion with a mixture of about ⅓ milk and ⅔ water boiled. He uses boiled feedings more or less for months even from birth through the bottle period. (Scum on top of boiled milk = fat and protein.) Crozer and Griffith give the following as the approximately gain in weight, by a baby during the first year: The first month, 7 ounces a week; third and fourth month. 5½ ounces a week; fifth and sixth month, 4⅔ ounces a week; during the remainder of the year 3¾ ounces a week. Some pediatrists anticipate considerable less average gain, at various periods, than in above, while others look for more. The average gain seems to be about that indicated in the feeding chart arranged by the author.

Vegetables and cereals may be added gradually and carefully to a baby's diet usually at about 8 months as an introduction to table-feeding. A new food of a mixture (soft) of a meat substance, dried milk and a prepared cereal is being found very helpful in malnutrition cases (infants) and probably will soon be marketed. There is an increasing tendency to feed babies of all ages only once in 4 hours. It seems to produce the best results.

Dr. S. Josephine Baker, so long Director of the Bureau of Child Hygiene, of New York City, has advised the following methods in Infant Feeding:

MILK FORMULAE FOR FEEDING INFANTS PREPARED FOR THE AVERAGE BABY

By S. Josephine Baker, M.D., Director, Bureau of Child Hygiene, Department of Health, New York City

In L. H. Journal, September, 1922

Age	Weight	Amount of Milk	Amount of Water	Amount of Milk Sugar	Amount at Each Feeding	Times of Feeding	No. of Feedings Per Day	Total Amount in 24 hours
1st week	6–6½ lbs.	5 oz.	10 oz.	1 oz.*	2 oz.	2, 6, 9 A.M. 12, 3, 6, 10 P.M.	7	14 oz.
2d week	7–7½ lbs.	6 oz.	10 oz.	1 oz.*	2 oz.		7	14 oz.
3–4 weeks	7½–8½ lbs.	10 oz.	10 oz.	1 oz.*	2½ oz.		7	17½ oz.
2d month	10 lbs.	18 oz.	10 oz.	6 drams*	3½ oz.		7	24½ oz.
3d month	11 lbs.	18 oz.	10 oz.	5 drams*	4 oz.		7	28 oz.
4th month	12 lbs.	22 oz.	8 oz.†	5 drams*	5 oz.	6 and 9 A.M. 12, 3, 6, 9 P.M.	6	30 oz.
5th month	13½ lbs.	26 oz.	8 oz.†	4 drams*	5½ oz.		6	33 oz.
6th month	15 lbs.	30 oz.	8 oz.†	4 drams*	7 oz.		5	35 oz.
7th month	16 lbs.	32 oz.	8 oz.†	3 drams*	8 oz.		5	40 oz.
8th month	17 lbs.	32 oz.	8 oz.†	3 drams*	8 oz.	6 and 10 A.M. 2, 6 and 10 P.M.	5	40 oz.
9th month	18 lbs.	34 oz.	6 oz.†	2 drams*	8 oz.		5	40 oz.
10th month	19 lbs.	34 oz.	6 oz.†	2 drams*	8 oz.		5	40 oz.
11th month	20 lbs.	36 oz.	4 oz.†	.....	8 oz.		5	40 oz.
12th month	21 lbs.	40 oz.	0 oz.	.....	8 oz.		5	40 oz.

* Use only half the amount of sugar indicated if cane sugar is substituted for milk sugar in these formulæ.
† Use barley water in making up formulæ after three months of age.
NOTE: One dram equals one teaspoonful.

DRY MILKS

Dry milks are used for temporary digestive disturbances, for convenience in traveling, etc. Among such dry milks are Dryco, Mammala, etc. To furnish 50 calories per pound per day of Dryco give three tablespoonfuls (level) for every pound of the body weight of a baby. One tablespoonful has 16 calories. Hence a 7-lb infant requires—7 x 50 calories = equals —350 calories (16 calories per tablespoonful = 21 + tablespoonfuls in 24 hours). Mix one tablespoonful to water 1 ounce = 1 to 8 by weight = mixture of 5½% lactose, 1½% fat and + 4% of protein. Indigestive disturbance or food injury begin low—one tablespoonful Dryco in 2 to 4 ozs. of water according to age and size of infant. It must be made fresh for each feeding. 8 level tablespoonfuls Dryco = 1 oz., 1 oz. = 127 calories. 8 level tablespoonfuls Dryco = ⅛ oz. or 16 calories.

[The producers of Dryco have recommended the following in the use of Dryco:

FEEDING TABLE FOR THE USE OF DRYCO

Weight of baby in pounds	Amount of Dryco each feeding level tbsp.	Amount water each feeding ounces	Number feedings per day	Intervals of feeding	Total Calories per day
5	2	2½	7	3 hours	224
6	2½	3	7	3 "	280
7	3	3½	7	3 "	336
8	3	4	7	3 "	336
9	3½	4½	7	3 "	392
10	4	5	7	3 "	448
11	4	5	7	3 "	448
12	5	6	6	3 "	480
13	5½	6½	6	3 "	528
14	6	7	6	3 "	576
15	6½	7½	6	3 "	624
16	8	8	5	4 "	640
17	8	8	5	4 "	640
18	8	8	5	4 "	640

THE NUMBER OF FEEDINGS TO BE GIVEN IN A DAY

For babies up to 12 pounds—7 feedings.

A.M.	A.M.	M	P.M.	P.M.	P.M.	A.M.
6	9	12	3	6	10	2

For babies 12-16 pounds—6 feedings:

A.M.	A.M.	M	P.M.	P.M.	P.M.
6	9	12	3	6	10

For babies above 16 pounds—5 feedings:

A.M.	A.M.	P.M.	P.M.	P.M.
6	10	2	6	10

1 oz. by weight—127 calories
8 level tablespoonfuls (leveled with a knife)—1 oz. by weight
1 level tablespoonful (leveled with a knife)—16 calories

The simplest general rule is to give 2½ level tablespoonfuls per day for each pound of the infant's weight. Dissolve in one more ounce of water than there are tablespoonfuls of DRYCO per feeding.

At 18 pounds, use barley gruel as dilutant and add sugar. Barley gruel may be made with 2 level tablespoonfuls of barley flour to the pint of water, boiled for 20 minutes, strained, and salted to taste. Cook enough barley for the full 24 hours and when mixing the food, dissolve the DRYCO in hot water, adding the barley gruel last. At first use 1 oz. of barley gruel to 7 ozs. of water and DRYCO, then 2 ozs. of barley gruel to 6 ozs. of water and DRYCO up to 4 ozs. of barley gruel to 4 oz. of the water and DRYCO mixture. Begin with one-half teaspoonful of sugar in alternate bottles and gradually increase to one level teaspoonful to each bottle.

Over 18-20 pounds feed well cooked cereals in addition to bottle feedings.

CONSTIPATION—The treatment of constipation depends on the cause. One of the most frequent causes when DRYCO is used is underfeeding. Be sure that you are using 2½ level tablespoonfuls of DRYCO per day for every pound of the baby's weight, as shown in the feeding table.

Another cause of constipation is insufficient fluids. Give at each feeding at least one more ounce of water than the months of the baby's age up to a maximum of 8 ozs. at 7 months. During the first 2 months 7 feedings of 3 to 4 ozs. are necessary. If these conditions are being fulfilled and the stools are constipated granulated (cane) sugar or Dextri-Maltose No. 3, may be given as much as a level teaspoonful in each feeding. Orange juice may be given once or twice a day an hour before feeding, beginning with a teaspoonful and increasing a teaspoonful every 3 to 4 days until the juice of a full orange is given daily.

PROTOLAC

Fermentative diarrhea with frequent watery, acid stools, which often excoriate the buttocks, calls for a non-fermentative or protein food. This is best given in the form of fat free milk and Protolas so that the diarrhea may be controlled before starting DRYCO.

Mix 2 packages of Protolac of 10 grams each in 16 ozs. of fat free

milk, boil this actively together for 10 minutes, then add 1 pint of cold water and bring to the boiling point again. Give the proper amount at the proper intervals for the age and weight as indicated in the table.

After the stools have become good and firm change to DRYCO, using it as indicated above.

The author has found Mead's Dextri-Maltose of very great service as a carbohydrate and food in the feeding of infants. The company that produce the same recommend the following methods in its use.

In intestenal disturbances or malnutrition they suggest the below stated measures:

FEEDING TABLE NO. 1

Feeding Mixtures Suitable for the Average Well Baby

Baby's Age in Months	Weight of Baby, Pounds	Amount Cow's Milk, Ounces	Amount Boiled Water, Ounces	Level Tablespoonfuls Dextri-Maltose	Amount of Each Feeding Ounces	Number Feedings in 24 hours
1	7	10	11	4	3	7
1	8	12	16	6	4	7
1	9	14	14	6	4	7
1	10	16	12	6	4	7
2	8	12	16	6	4	7
2	9	14	14	6	4	7
2	10	16	12	6	4	7
2	11	18	14	6	4½	7
3	10	16	12	6	4	7
3	11	18	14	6	4½	7
3	12	20	15	6	5	7
3	13	22	13	6	5	7
4	12	20	16	6	6	6
4	13	22	14	6	6	6
4	14	24	12	6	6	6
5	13	22	11	6	6½	5
5	14	24	11	6	7	5
5	15	26	9	6	7	5
6	13	22	13	6	7	5
6	14	24	11	6	7	5
6	15	26	9	6	7	5
6	16	28	12	6	8	5
7-8-9	14	24	16	6	8	5
	15	26	14	6	8	5
	16	28	12	6	8	5
	17	30	10	6	8	5
	18	32	8	6	8	5
	19	34	6	6	8	5
10-11-12	20	36	4	6	8	5
	21	38	2	6	8	5
	22	40	0	4	8	5
	23	40	0	4	8	5
	24	40	0	4	8	5

NOTE—When first starting a feeding of Dextri-Maltose, cow's milk and water for infants of any age, use 4 level tablespoonfuls Dextri-Maltose No. 1 in the feeding mixture. Then gradually increase the Dextri-Maltose to 6 level tablespoonfuls. Give plenty of cooled boiled water between feedings. In ordinary feeding cases use Dextri-Maltose No. 1; in constipated cases use Dextri-Maltose No. 3.

HOURS TO FEED

10 Times per day—6, 8, 10 12 A. M.; 2, 4, 6, 8, 10 P. M.; 2 A. M.
8 Times per day—6, 8:30, 11 A. M.; 1:30, 4, 6:30, 9 P. M.; 2 A. M.
7 Times per day—6, 9, 12 A. M.; 3, 6, 9 P. M.; 2 A. M.
6 Times per day—6, 9, 12 A. M.; 3, 6, 9 P. M.
5 Times per day—6, 10 A. M.; 2, 6, 10 P. M.

INTESTINAL-INDIGESTION-DIARRHOEAS

When baby is having Loose, Green or Yellowish Stools, containing mucus or curds, immediately omit Dextri-Maltose and boil the milk and water mixture 2 minutes. Then cool to blood heat and feed. As stools become normal, gradually add the Dextri-Maltose to the feeding until the prescribed quantity for well babies is reached.

In the condition described above, but where the baby is having a temperature (infectious dirrhoeas), give a cathartic followed by a diet of Barley Water, prepared from Mead's Barley Flour (without milk) for 12 hours. After 12 hours, omit the Barley water and feed milk and water boiled together for 2 minutes, without Dextri-Maltose, until the stools become normal; then gradually add the Dextri-Maltose No. 1 until the baby is taking a formula suited to its age and weight.

REGURGITATION-VOMITING

When baby vomits or spits up shortly after feeding, boil the milk and water together for 2 minutes and reduce the amount of each feeding for a few days, returning to the regular feeding as soon as vomiting stops.

Regurgitation is often prevented by placing the baby in an upright position immediately after he has finished nursing, with his head on the mother's shoulder, patting him gently on the buttocks until he has expelled the air swallowed during nursing.

REGULATING THE DIET IN CONSTIPATION

Many cases of constipation in the bottle-fed baby are the result of a negative balance of the potassium and calcium salts. In such cases the use of Dextri-Maltose No. 3 in the same amount as Dextri-Maltose No. 1, will change this balance and will generally produce soft, normal stools. In some instances, especially in older infants, it is necessary to increase temporarily the amount of Dextri-Maltose No. 3 to 8 level tablespoonfuls in order to obtain the desired results after which continue with 6 level tablespoonfuls of Dextri-Maltose No. 3.

FEEDING TABLE NO. 2

Feeding Mixtures for Marasmic (Malnourished) Babies*

Baby's Age in Months	Weight of Baby, Pounds	Amount Cow's Milk, Ounces	Amount Boiled Water, Ounces	Level Tablespoonfuls Dextri-Maltose	Amount of Each Feeding Ounces	Number Feedings in 24 hours
3	4	6	14	4	2	10
3	5	9	11	4	2	10
3	6	12	18	4	3	10
3	7	12	15	4	3	10
4	5	9	11	6	3	10
4	6	12	18	6	3	10
5	7	15	25	6	4	10
5	8	18	22	4	4	10
6	7	15	25	6	5	8
6	8	18	22	6	5	8
6	9	21	20	4	5	8
7	8	18	24	6	7	6
7	9	21	21	6	7	6
7	10	24	24	4	8	6
8	10	24	24	6	8	6
8	11	27	21	4	8	6
9	11	27	21	6	8	6
9	12	30	18	6	8	6
10	13	33	15	6	8	6
11	14	36	20	6	8	7
12	15	39	17	6	8	7
12	16	42	14	6	8	7

*First Feedings of Marasmic (Malnourished) Infants

During the first few days of feeding a marasmic infant, use one-half the amount of milk prescribed in table No. 2 for an infant of the same age and weight. Then for each ounce of milk less than that prescribed, add 1 ounce of water to the amount of water called for in the formula. Boil the milk and water together for 2 minutes. Use Dextri-Maltose No. 1 in the same quantity as the formula calls for. Gradually increase the amount of milk in the feeding (about 1 oz. every other day), reducing the water in like amount, until the baby is taking the full table feedings, after which, stop boiling feedings.

HOW TO PREPARE BOILED FEEDINGS

Boiled feedings should be prepared as follows: After the proper quantities of milk and water are measured separately, pour them together and place on the stove, allowing them to come to an active boil, and boil for about 2 minutes, stirring constantly in order to avoid a scum forming, remove from stove—then gradually add the Dextri-Maltose No. 1, stirring until same is completely dissolved. The milk and water should always be boiled together. The same results are not obtained when these ingredients are boiled separately. Dissolve Dextri-Maltose thoroughly.

FACTS ON FEEDING BABIES, ETC.

FEEDING QANTITIES

In feeding a baby the quantities to be given are usually about as follows:

The first two days little raw water, 3 or 4 teaspoonfuls every 2 to 4 hours. Then an ounce of milk and water about ¼ or ⅓ cow's milk, or the mother's breast-milk every (2?) 3 or 4 hours. At 1 month old 2 ounces every 3 or 4 hours. At 3 months old 3 ounces every 3 hours or a little more every 4 hours. At 5 months old 4½ or 5 ounces the same way. At 9 months old 6 ounces every 4 hours. At 1 year old ½ pint 3 times a day and a little table food. (Starchy food.) All night feedings are stopped beginning at the age of 4 months.

The carbohydrates come mostly from the vegetable foods, the starches and sugars, the cereals, etc., peas, beans, potatoes, etc. The sugars are the cane sugars (sucroses) and the glucoses (grape sugars).

The carbohydrates do not repair tissue, but produce energy or muscular power. Any excess of the carbohydrate is changed into fat and stored in the body as such. It is also stored in the body as animal starch (glycogen). Some of the glycogen is continuously distributed to the body between feedings to supply energy and heat.

Fats used by the body as food come from both the animal and the vegetable kingdoms. They also produce heat and energy. Cream and bacon are the most digestible and serviceable fats. Fat in excess is stored in the body as such for use in indisposition, etc. (e. g., bears live upon their fat in winter) certain elements called vitamins have been found necessary to prevent soft, bent bones in babies. Deficiency in vitamins produces marasmus, scurvy and rickets.

Oranges, lemons and vegetables added to the diet promptly will help correct the evil.

Babies which have been given sterilized milk or some of the poorer proprietary foods need such at once. In fact any bottle-fed baby should have orange juice daily, a teaspoonful or more clear or in water.

Three times a day between such number of feedings to prevent rickets, etc.

The caloric value of foodstuffs is commonly calculated to be:

1 gram of protein = 4.0 calories
1 gram of carbohydrate = 4.0 calories
1 gram fat = 8.9 calories

Body constituents are carbon, hydrogen, oxygen, nitrogen, principally, also chlorin, lime, magnesia, phosphorus, sulphur, etc. There are also mineral elements in the form of so-called salts. They are combined with various acids making phosphates, chlorids, sulphates, etc.

The materials we call food, which regenerates and develops the body, we call food or foodstuffs. They are water (H_2O) protein (hydrogen, oxygen, nitrogen and carbon) carbohydrates (hydrogen, oxygen and carbon). Fat or hydrocarbon (oxygen, hydrogen and carbon in the form of fatty acids) as oleic, stearic, palmitic, in combination with glycerine, which serves as a base for such.

There are also mineral salts of lime, phosphate, sodium, iron, etc., for structural purposes. All animal food and many vegetable foods such as vegetables and the cereals contain protein we well know. Protein is the great repairer of the tissues of the body. Whatever protein is not thus used by the body goes with various other foods to furnish body heat and muscular power.

The food of an individual, we well know, whether of a baby or of a grown person cannot be used for the body in the condition in which it is taken into it. It must be prepared for the body tissues. The proteins or nitrogenous foods must be changed into soluble peptones.

DIET FOR YOUNG CHILDREN

DIET—Suggested by Department of Health of the City of New York—(Charts of 1921)

Bureau of Child Hygiene

[**Author's Note.**—* or [ ] herein, indicates information introduced, or the usual modification or detailed method employed by the author of this book in feeding the average well child, at the respective age. In feeding the sick—child, especially in the poisoning of a child, of such age, it is well to select, from these normal feedings, a non-conflicting diet in conformity with the restrictions previously outlined and indicated in this chapter, by the author, as suitable feedings for an adult, in a similar poisoning].

DIET (12 to 18 Months of Age)

[At this age the average child requires 850 to 1200 calories daily]

6.00 TO 6.30 OR 9.00 A. M.—

[Juice of one half to one orange, or two tablespoonfuls prune juice, or two tablespoonfuls pineapple or tomato juice. Little or no sugar in it; perhaps with water.]

7.00 TO 7.30 A. M.—

Two to three tablespoonfuls of cereal such as oatmeal, hominy, farina, corn flakes, puffed rice, krumbles, tapico, cream of wheat or wheatena, made very thin and served with milk and one teaspoonful of sugar. Glass of milk (eight ounces.) Clear, or, with 1 or 2 ounces of water, to reduce the size of the curd and to soften it.

11 A. M.—

Glass of milk (eight ounces). Cracker or piece of zwieback or piece of stale bread with crust.

1.30 TO 2.00 P. M.—

One article to be selected from each of the following groups:
1. Beef juice, two to four tablespoonfuls; coddled egg; scraped beef, one tablespoonful; mutton or chicken broth, one cupful; minced chicken, one tablespoonful; vegetable soup, one cupful. 2. Bread, zwieback, [toasted bread], or cracker. 3. Baked or mashed potato, rice.

5:30 TO 6.00 P. M.—

Cereal and milk. Zwieback or stale bread toasted, [or Graham, Arrowroot, Wheatsworth, or "Baby" cracker.]

10 P. M.—

Glass of milk (eight ounces). [With or without 1 or 2 oz. of water.]
Raw fruit juice should not be given to young children at the same meal with milk. It should be given one-half hour before, or at least one-half after a meal.
Give egg at only one meal a day, mid-day preferred. If fat digestion poor, avoid much yolk. If getting much other protein, give egg only two to four times a week.

DIET (18 to 24 Months of Age)

[Requires 900 to 1200 calories daily]

6.00 TO 6.20 A. M.—

[One to] two ounces of orange juice, or pulp of six stewed prunes, or two tablespoonfuls baked apple (strained), or two tablespoonfuls pineapple juice, [raw or cooked tomato juice].

7.00 TO 8.00 A. M.—

Three tablespoonfuls of cereal with milk and small amount of sugar. Glass of milk (eight ounces). Piece of toast or bread, buttered.

11 A. M.—

Milk (eight ounces).* Cracker, zwieback, toast, or bread.*

1.30 TO 2.00 P. M.—

One article to be selected from each of the following groups:
1. Beef juice, two to four tablespoonfuls, with bread; egg, soft boiled, poached or coddled; scraped beef, one tablespoonful; mutton, chicken or beef broth, one cupful; minced chicken, two tablespoonfuls; vegetable soup, one cupful; lamb chop. 2. Bread, zwieback or cracker.* 3. Boiled rice, small, baked potato, spinach, well cooked carrots, [fresh or canned peas, asparagus, stringless string beans]. 4. Cornstarch pudding with milk, rice pudding, baked [or boiled] custard junket, [whey], two tablespoonfuls pulp of baked apple or pulp of six prunes.

5.30 TO 6.00 P. M.—

Cereal and milk. *Zwieback or stale bread, buttered. *Stewed fruits.

10.00 P. M.—

Milk (eight ounces).*
*Also as for younger child.

DIET (2 to 4 Years of Age)

[Requires 1,000 to 1,400 calories daily]

NOTE—A cupful of milk and bread or a cracker may be given in mid-afternoon or at bedtime, if the child seems hungry.

7.00 A. M.—

Juice of one orange, or pulp of six stewed prunes, or two tablespoonfuls of baked apple, or two tablespoonfuls pineapple juice.

8.00 A. M.—

Cereal of medium thickness, four tablespoonfuls, with milk and one [level], teaspoonful sugar. Egg, soft boiled, poached or coddled. Toast or stale bread, (buttered).* Glass of milk or cup of cocoa.*

10.30 A. M.—

Glass of milk (eight ounces.)* One slice of bread, cracker or zwieback.*

1.30 P. M.—

One article each from groups 1, 3, 4 and 5 OR 2, 3, 4 and 5:
1. Chicken or beef broth, vegetable soup, milk soup made with a little potato or celery. 2. Egg (poached, coddled, boiled or scrambled), tablespoonful minced beefsteak, lamb chop, roast beef, broiled steak,

chicken, fresh broiled or boiled fish. 3. Baked, oiled, creamed or mashed potato, rice, marcaroni. 4. Two tablespoonfuls of fresh or canned vegetables such as peas, string beans, spinach, asparagus tips, squash, stewed celery, cauliflower. All these vegetables should be well cooked. Rice [jelly, jam] or bread pudding, junket whey* or custard, apple sauce or baked apple. Two tablespoonful (once a week), or plain vanilla ice cream.

5.30 TO 6.00 P. M.—

Cereal with milk toast or stale bread, lightly buttered. Egg (poached, soft boiled or coddled). One cup of milk or cocoa made with milk. Custard or stewed fruit.

DIET (4 to 6 Years of Age)

[Requires 1,300 to 1,600 calories daily]

7.30* A. M.—

7 A. M. Juice of one orange. Baked apple, or stewed prunes. (Fresh fruit may be given in season except raw apples, which should only be eaten later in the day. Fresh berries in small amounts may be given.) Cereal with milk and one teaspoonful sugar. Glass of milk* or cup of cocoa, made entirely with milk. Bread or toast with butter. Egg (soft boiled, poached, coddled, scrambled or omelet.)

10.30 A. M.—

Glass of milk (eight ounces)* and bread.

1.30 P. M.—

Select one article from each of groups 1, 3, 4, 5 and 6 OR 2, 3, 4, 5 and 6:

1. Chicken beef or mutton broth, vegetable, pea or bean soups or thick milk soups, strained before using. 2. Chicken, lamb, lamb chop, roast beef, beefsteak, minced beef, fish broiled, boiled or baked, egg (poached, soft boiled or coddled). 3. Vegetables in season except green corn, egg plant or raw vegetables such as radishes, cucumbers or tomatoes. 4. Potato baked, boiled lightly mashed. 5. Bread and butter. 6. Stewed fruit (peaches, prunes, apricots or apples) [strawberries, raspberries, or grapes if anemic] cookies or ginger snaps, plain cake, rice, tapioca, cornstarch or bread pudding, junkets [whey], or custards, ice cream (not oftener than once a week), jam, jelly, honey, dates or figs.

5.30 TO 6.00* P. M.—

Cereal with milk and sugar, or milk toast, or thick soup such as pea or cream of celery, or egg (coddled, poached, boiled or scrambled). Cocoa made with milk, or glass of milk (eight ounces). Bread and butter [peanut butter, jelly]. Plain pudding, cookie or [relishes, ginger bread], ginger snap, stewed fruit.

Acids Contained in Various Fruits

Apricot, banana, cherry, peach, pear, prune and watermelon each contain malic acid. Apple contains malic and gallic acids. Currant and gooseberry contain malic and citric acids. Citron, lemon, orange, limes and grape fruit contain chiefly citric acid; cantaloupe, rhubarb and lettuce also contain it. Cranberry contains malic, citric and benzoic acids. Grape contains tartaric acid. Spinach and tomato contain oxalic acid. Apple, banana, peach, pear and prune are less acid than most fruits. Apple, lemon, limes and orange contain patassium, calcium and magnesius. Salts are valuable as antiscorbutics. Apple contains a sodium salt and iron also. Calcic and potassic oxalates are found in asparagus, rhubarb, sorrel, spinach and tomato. Prunes are about 32 per cent sugar.

TOP MILK ("GRAVITY CREAM") AVERAGES

Result of milk standing undisturbed for 6 hours or more

QUANTITY	Approximate contained per cent of: Fat	Sugar	Protein
Top or upper 1 ounce	22½	4	2¾
" " 2 ounces	21½	4	2¾
" " 3 ounces	21	4	2¾
" " 4 ounces	20	4	2½
" " 5 ounces	18½	4	3
" " 6 ounces	17	4	3
" " 7 ounces	15¼	4	3
" " 8 ounces	14	4½	3
" " 9 ounces	12½	4¼	3
" " 10 ounces	11½	4⅓	3
" " 12 ounces	9⅘	4½	3
" " 16 ounces (½ bottle, or 1 pint)	7⅗	4½	3
" " 20 ounces	6⅕	4¾	3¼
" " 24 ounces	5⅕	4¾	3⅓
" " 28 ounces	4½	4¾	3⅓
The 32 ounces (or whole bottle or 1 quart	4	4¾	3⅓

Top milk formulas are not very well suited to the average baby unless the baby is over 6 months old or is unusually robust.

AMOUNT OF SLEEP IN 24 HOURS, USUALLY REQUIRED AT DIFFERENT AGES

Compiled by Albert H. Brundage, M.D.

Age	Hours
Birth to 6 Months	20 to 22
6 Months to 1 Year	18 to 20
1 to 2 Years	16 to 18
2 to 4 Years	12 to 14
4 to 6 Years	11 to 12
6 to 9 Years	10 to 12
9 to 12 Years	9 to 10
12 to 60 Years	7 to 9

In old age there should be more sleep, to compensate better for readier waste and exhaustion, but usually sleep is more or less fitful and diminished; sometimes mainly a series of drowsing, dozings, or nappings. An unnatural tendency to sleep is indicative of some disturbance of metabolism with degeneracy of the nervous tissue; may be due to improper eating, severe heat or cold, anxiety or mental excitement, overexertion, drunkenness, or other vicious habits. In sleep at various ages, pulse and breathing are slower, the temperature reduced, the muscular mechanisms and secreting organs reduced in activity, the eyeballs rolled upward and inward and the pupils contracted. From 2 to 5 A. M. vitality is low usually, hence a higher rate of mortality at such time among infants, the weak and the old. More or less folding of leaves and closing of flowers at night is analogous to human sleep.

PART XI.

GUIDE TO POST-MORTEM PROCEDURE.

(In Suspected Poisoning.)

In cases of suspected *poisoning*, the following practical directions are given by Professor Reese, to be observed by those who have charge of *post-mortem* examinations:—

1. Ascertain whether the individual has labored under any previous illness; and how long a time had elapsed between the first suspicious symptoms and his death; also, the time that had elapsed after death before the inspection is made.

2. Note all the circumstances leading to a suspicion of murder or suicide—such as the position and general appearance of the body, and the presence of bottles or papers containing poison about his person, or in the room.

3. Collect any vomited matters, especially those *first* ejected, and preserve them in a clean glass jar, carefully stoppered and labelled. The vessel in which the vomited matters have been contained should be carefully inspected for any *solid* (mineral) matters which may have sunk to the bottom, or adhered to the sides. If no vomited matters be procurable, and vomiting has taken place on the dress, bed-clothes, furniture, etc., then portions of these must be carefully preserved for future examination.

4. Before removing the stomach, apply *two* ligatures beyond each extremity, dividing between each pair, so as to prevent the loss of any of the contents.

5. If the stomach be opened for inspection, this should be performed in a perfectly clean dish, and the contents collected carefully in a graduated vessel, so as to properly estimate their quantity. [Note here, also, the presence of blood, mucus, bile, or undigested food.] These contents should be preserved in a perfectly clean glass jar, securely stoppered, covered over with

bladder and sealed. The contents of the *duodenum* should be collected and preserved separately.

6. Carefully inspect the state of the *throat, œsophagus,* and *wind-pipe* for the presence of foreign substances, and for marks of inflammation or corrosion.

7. Observe the condition of the *large intestine*—especially the *rectum;* the presence of hardened fæces would indicate that purging had not very recently taken place.

8. Note any morbid changes in the *lungs,* as congestion, inflammation or effusion; in the *heart,* as contraction, flaccidity, presence of a clot; and the condition of the contained blood.

9. Examine the state of the *brain* and *spinal marrow,* and, in the female, the condition of the uterus, ovaries, and genital organs. (Poisons have sometimes been introduced into the vagina.)

10. Along with the contents of the stomach and duodenum, the viscera that are to be reserved for chemical analysis are the stomach and duodenum (to be kept separate from the others), the liver and gall-bladder, spleen, kidney, rectum, and urinary bladder with its contents. Sometimes, also, a portion of the *blood* may be required for the examination.

11. As the legal authorities will rigorously insist upon the proof of the *identity* of the matters alleged to be poisonous, it is of the greatest importance to preserve such matters from all possible contamination by incautious contact with calico or paper for wrapping up the specimens. When once the suspected articles are deposited in the hands of a medical man, he must preserve them strictly under lock and key, and confide them only to a trusty agent for transportation. Many cases are on record where the chemical evidence failed simply from a want of power clearly to establish the *identity* of the matters analyzed.

Actual testing for poisons in cases of suspected criminality ought to be undertaken only by those whose chemical knowledge and skill are considerable.

A post mortem examination should be made in regular and generally established routine, that it may be orderly, etc. The presence of other medical men and of an assistant to make notes may be of subsequent importance. The report on the autopsy should be clear, accurate, concise, and without expression of personal opinion. The report on the analysis should be comprehensive and as far as possible conclusive.

DIRECTIONS FOR MAKING POST-MORTEM EXAMINATIONS.

The following suggestions and directions, by Dr. Witherstine, for making post-mortem examinations, are worthy of consideration :

In conducting post-mortem examinations, with a view either to pathological study or medico-legal investigation, *order* and *method* are of great importance.

The three great cavities—the HEAD, the CHEST, and the ABDOMEN—should always be examined, whether suspicion of disease in them exists or not. First, however (the autopsy being made from twelve to thirty-six hours after death), we should note the EXTERNAL APPEARANCE of the body—its *size, weight, conformation, color of the skin,* etc. (In cases of suspected violence, even abrasion should be minutely described.)

To examine the HEAD, an incision should be made through the scalp, across the top of the head, from ear to ear; the two flaps thus formed should be reflected, the one over the forehead, the other over the occiput. The nature of the attachment of the occipito-frontalis muscle to the bone beneath is such as to allow, very easily, the loosening of the scalp. The cranium (calvaria) is now to be removed by means of a small saw.

For the purpose of holding the head firmly during the use of the saw, Dr. T. A. Demme has furnished, as a substitute for the craniotome of Mr. Lund, of London, a *cranium-holder,* which enables the operator to make a section of the skull in any direction. It consists simply of a bar of iron, curved like the letter U, at each extremity of which two drill-screws are placed, which, when forced down upon the bone, holds the bar firmly *in situ,* and enables the examiner to control the head. The legs of the instrument, for use, are placed upon the lateral portions of the skull over the squamous portions of the temporal bones.

The section of the cranium with the saw should be made through its outer table completely around the head—from *before backward,* from below the frontal protuberances to the squamous portion of the temporal bone, and from *behind forward,* from the occipital protuberance to the squamous portion of the temporal bone, meeting the line just described. The shape of the piece thus cut out enables it to be maintained in its proper position when the parts are readjusted. It is re-

moved by the aid of an elevator, or chisel and hammer, fracturing the inner table of the skull by strokes so applied as not to pierce the brain.

The dura-mater is next to be cut through, on each side of the superior longitudinal sinus; after which dividing the *falx cerebri,* the brain may be raised carefully with the hand placed under its anterior portion. The internal carotid artery and cranial nerves, etc., are now to be severed by the knife, and finally the vertebral arteries and spinal chord. The brain itself may then be taken out and inspected, by slicing it from the upper part downward, in successive horizontal layers.

To examine the SPINAL COLUMN, an incision should be made from the occipital protuberance to the extremity of the os occygis. The deep muscles of the back should then be loosened from their attachments so as to expose the laminæ and spinous processes of all the vertebræ. With the chisel and mallet, or saw, we must cut through the arches of the vertebræ on each side, close to their articular processes. After thus opening the spinal canal, the cord is to be exposed by dividing the dura-mater through its whole length.

To examine the NECK, an incision should be made through the skin, extending from above the hyoid bone to the upper part of the sternum. Avoiding penetration of the large veins of the neck, the parts to be examined may be carefully dissected, and, if desirable, removed from the body. The thyroid gland, larynx, and its appendages, tongue, pharynx, œsophagus, blood-vessels, and nerves of the neck, may be thus viewed.

To examine the CHEST, two incisions are desirable; the one from the root of the neck, in front, to the extremity of the ensiform cartilage; the other at right angles to this, across the middle of the thorax. The cartilages of the ribs are to be cut through at the lines of junction with the ribs. The ensiform cartilage, being drawn outward, is to be detached from the soft parts, the knife being held *close to the sternum.* The sterno-clavicular articulation may now be opened, and the sternum with the costal cartilages raised from its position, a cautious use of the knife being made to remove the adherent soft parts.

The thoracic viscera are now exposed, and may be drawn out with care and inspected in detail.

To examine the ABDOMEN, make a crucial incision; the one branch extending from the sternum to the pubes, passing to the left of the umbilicus; the other transversely across the

middle of the abdomen. Care must be taken, in making these incisions, not to injure the subjacent viscera.

Before removing the stomach or any portion of the intestines, ligatures should be placed above and below the part that is to be separated.

When—as is always desirable, if possible—both of the large cavities of the trunk are to be opened, a single incision, extending from the top of the sternum to the symphysis pubis, may be made.

In every case incisions through the skin should be made, as far as practicable, only in those parts which are usually covered by the clothes of the deceased. It is generally advisable, when the abdomen or thorax has been opened, to fill the cavities with bran or sawdust. After the examination has been completed, the edges of the divided integument should be brought together, and retained in apposition by the common continued suture.

WEIGHTS AND MEASURES OF VISCERA.

The following are said to be the average weights and measurements of the viscera in health. Some allowance must, of course, be made for extremes (either way) of height and weight. The measurements are in inches:

Heart—Adult, Male..... 11 oz.	Usually about the size of the closed fist (*i. e.*, 5 x 3½ x 2½ in.).
Heart—Adult, Female..... 9 oz.	
Brain—Adult Male .....49½ oz.	{ Cuvier, 64 oz. { Byron, 58 oz.
Brain—Adult Female.....44 oz.	
Spinal Cord... 1 oz. to 1¾ oz.	(18 in. long.)
Liver.....50 oz. to 60 oz.	(12 x 7 x 3 in.)
Pancreas..... 2¼ oz. to 3½ oz.	
Spleen. ..... 5 oz. to 7 oz.	
Lungs—Ad., Male (together) 45 oz.	
Lungs—Ad., Female " 32 oz.	
Stomach.....4½ to 7 oz.	
(Moderately full, 12 in. horiz. x 4 in. vert.	Holds 3 pints.)
Thyroid body.....1 oz. to 2 oz.	
Thymus at birth..... ½ oz.	
Kidneys, together .....9 to 10 oz.	(Size, 4 x 2 x 1 in. each.)
Suprarenal capsules.... 2 drachms.	
Prostate gland.....6 drachms.	
Testicles, together....¾ oz. to 1 oz.	
Unimpregnated uterus.7 to 12 drachms.	(Size, 3 x 2 x 1 in. or a little more.)

1 line (written ″) is 1-12 of an inch (written ′).

HEIGHT, WEIGHT, GIRTH OF CHEST (Averages)

(From Report of Brit. Anthropom. Com., 1883.) (Adapted from Welcome.)

	lbs.		lbs.
Weight at birth	6.8	Weight at seven months ...	13.4
Weight at one month	7.4	Weight at eight months'	14.4
Weight at two months	8.4	Weight at nine months	15.8
Weight at three months	9.6	Weight at ten months	16.8
Weight at four months	10.8	Weight at eleven months ...	17.8
Weight at five months	11.8	Weight at twelve months ..	18.8
Weight at six months	12.4		

MALES						FEMALES					
Age. yr.	Height ft. in.	Weight lbs.	Age yr.	Height ft. in.	Weight lbs.	Age yr.	Height ft. in.	Weight lbs.	Age yr.	Height ft. in.	Weight lbs.
1	2 5½	18½	14	4 11¼	92	1	2 3½	18	14	4 11¾	96¾
2	2 8½	32½	15	5 2¼	102¾	2	2 7	25¼	15	5 1	106¼
3	2 11	34	16	5 4¼	119	3	2 10	31½	16	5 1¾	113
4	3 1	37	17	5 6¼	131	4	3 0	36	17	5 2½	115½
5	3 4	40	18	5 7	137½	5	3 3	39	18	5 2½	121
6	3 7	44½	19	5 7¼	139½	6	3 6	41¾	19	5 2¾	124
7	3 10	49¾	20	5 7½	143¼	7	3 8	47½	20	5 3	123½
8	3 11	55	21	5 7½	145	8	3 10½	52	21	5 3	122
9	4 1¾	60½	22	5 7½	147	9	4 0¾	55½	22	5 3	123½
10	4 3¾	67½	23	5 7½	147½	10	4 3	62	23	5 3	123
11	4 5½	72	24	5 7¾	148	11	4 5	68	24	5 2¾	121
12	4 7	76¾	25–30	5 7¾	152¼	12	4 7½	76½	25–30	5 2	120
13	4 9	82½	31–35	5 8	160	13	4 9¾	87	31–35	5 1	121

COMPARISONS IN ADULT MALE

Height ft. in.	Weight lbs.	Chest Girth in.	Height ft. in.	Weight lbs.	Chest Girth in.
5 0	112	33½	5 7	148	38
5 1	116	34	5 8	155	38½
5 2	126	35	5 9	162	39
5 3	133	35	5 10	169	39½
5 4	139	36	5 11	174	40
5 5	142	37	6 0	178	40½
5 6	145	37½	6 1	182	41

COMPARISONS IN ADULT FEMALE

Height ft. in.	Weight lbs.	Height ft. in.	Weight lbs.	Height ft. in.	Weight lbs.
4 10	98	5 2	114	5 6	139
4 11	102	5 3	121	5 7	148
5 0	105	5 4	128	5 8	158
5 1	110	5 5	135		

NOTE.—Growth is most rapid during the first five years of life, the *rate* of growth being about the same in both sexes, girls being a little shorter and lighter than boys. From 5 to 10, boys grow more rapidly than girls. From 10 to 15, girls grow more rapidly than boys, and at 11½ to 14½ they are actually taller, and from 12½ to 15½ actually heavier than boys. From 15 to 20, boys begin again to increase more rapidly than girls, and complete their growth at about 23. After 15, girls grow more slowly, and practically reach their full height and weight at 20. During childhood increase in weight is more marked in the winter, and increase in height in the summer. In old age, weight greater in winter.

Average weight of woman's clothing is about 1/20 of her body-weight; man's about 1/25 of his body-weight.

POST MORTEM APPEARANCES IN POISONING.

THE MINERAL ACIDS (IN GENERAL).

The presence or absence of rigor mortis may be of considerable importance in determining probable time of death in a case of poisoning. Bichat declares he never found rigor mortis in death from charcoal asphyxiation. Brouardel declares he always found it. It may be said in a general way that rigor mortis first makes its appearance from the third to the sixth hour after death. But after poisoning by a large dose of strychnine, rigor mortis immediately succeeds the muscular contraction, if such exists at time of death.

Appearance of body may be healthy. As a rule there are stains about the mouth, fingers and other places with which the acid has come in contact. Mouth cavity and esophagus are usually white and corroded at first but become dark brown and shriveled; mucous membrane detachable. Epiglottis and glottis swollen. The stomach is sometimes contracted, sometimes distended with gas; contains a thick, dark-brown fluid. Outer surface of stomach and intestines is very vascular and that of the stomach may be corroded or perforated. Inner surface of stomach may appear charred and the mucous membrane between the rugae present a scarlet hue. In poisoning by the acids the lining membrane of the esophagus is usually wrinkled or furrowed longitudinally and the mucous membrane of the stomach raised in discolored ridges. The pylorus is usually contracted. The appearance of the inner surface of the small intestines is similar to that of the stomach, if the patient has lived long enough, but is less in degree. Perforation, if it occurs, usually takes place posteriorly if before or after death the person lay on the back, and the edges of the rent are found to be softened. The peritoneum may be greatly inflamed from the escape of the stomach contents through the perforation into

the abdominal cavity. The bodies of persons dead from poisoning by mineral acid seem, for some time, to resist putrefaction.

MINERAL ACIDS.

(In detail).

ACID HYDROCHLORIC.

No stains on lips or face. Usually mucous membrane of mouth, esophagus, etc., are white or whitish-brown, blackened or charred. Ridges on inside of stomach. Glottis and larynx may be injected and corroded.

Hydrochloric Acid poisoning has not been found to result in perforation.

ACID NITRIC.

Discoloration of lips, tongue and inside of the mouth. Mouth and spots on skin where acid has been in contact appear yellow, which is intensified by a solution of caustic potash which would discharge Bromine or Iodine stains. Mucous membrane of digestive tract eroded and softened, but stomach rarely perforated although softened; it may be shreddy. The color appearance of the stomach varies—it may be yellow, due to the action of the acid upon the mucous membrane; black from action of acid on the blood; green or brown from action of acid on the bile. Bladder usually is empty. Blood dark and thick. Lining membrane of esophagus may be divided into minute squares by longitudinal and transverse furrows. Seldom that action of acid is well marked beyond the duodenum.

ACID SULPHURIC.

Post mortem appearances differ in stomach and internal organs according to whether death is rapid or slow, whether the patient dies from acute poisoning, or lives some time and dies from ulceration and

contraction of some part of the alimentary canal. Usual appearances are: larynx, trachea and lungs softened and blackened; esophagus grayish or blackish, softened, and mucous membrane may be separated and peel off. Stomach usually is greatly inflamed in patches or generally, crossed by black lines, and softened or perforated; often contracted and collapsed; black corrugated mucous membrane which may be partly stripped off with underneath surface intensely red; contents may be blackish, pulpy and tar-like, from altered blood; contents of blood vessels black and hard; if there has been perforation, the edges of the opening appear dark and ragged, and the adjoining viscera is blackened and softened. If death was not immediate, may be evidences of inflammation of intestines, peritoneum, etc. In rapid cases extensive coagulation of epithelium in the convoluted and straight urinary tubes; the kidney parenchyma is destroyed but there is absence of inflammation. If acid entered the air passages they will present evidences of corrosive action. Skin of face or surrounding parts touched by acid will generally be corroded and as if covered with white paint, browned or blackened. (But if the poison was taken from a spoon or the neck of a bottle, the mouth may show no signs.)

VEGETABLE ACIDS, CARBOLIC ACID, ETC.

ACID ACETIC.

The mucous membrane of the stomach is not corroded nor softened but is blackish near the pylorus. Coagulated blood in submucous areolar tissue of stomach, interspersed with black elevations. Tongue and esophagus a dirty brown color.

ACID CARBOLIC.

The odor of the acid can be perceived in the body after death. When Carbolic Acid is introduced by

subcutaneous injection or by outward application there are no characteristic post mortem appearances; but when by mouth, grayish white, or when dry, brownish, leathery, wrinkled spots may be found on the cheeks or lips; the mouth, throat, esophagus and stomach often are whitened and sodden and their mucous membrane may be readily detached. If the acid was concentrated, the surface may be eroded. There is reddening (inflammation) between the folds of the stomach. Sometimes the stomach is thickened, contracted and blanched; often greatly congested, and the mucous membrane detached or destroyed. Stomach eschars usually longitudinal, white or gray, involving crests of the folds. Wall of stomach has leathery feel. The duodenum, further portions of intestines, liver and spleen may be affected. Respiratory passages often inflamed and lungs usually filled with blood. Left ventricle of the heart is contracted; right ventricle is distended. The blood is fluid and dark colored. Usually, bladder is empty. The brain sometimes is congested, fluid being found in the ventricles. Blood vessels of liver, kidneys and spleen are gorged with blood. Death resulting from sudden nervous shock, caused by taking a large quantity of the acid, would of course present different post mortem appearances from the foregoing.

ACID HYDROCYANIC.

There are no constant or characteristic lesions. The stomach may be normal or congested. A general venous congestion is the most common sign. It may be said in a general way that with the exception of the changes which may be found in the stomach after doses of **Potassium Cyanide** the pathological changes produced by Hydrocyanic Acid and Potassium Cyanide are very similar to those produced by suffocation. The most noticeable fact about the body is the presence of bright-red spots or patches on the surface of it, due to the

formation of cyanmethae-moglobin. The lungs and right heart are full of blood and the pulmonic block produces a backward engorgement. If death be rapid, the left side of the heart is usually empty and strongly contracted; but if death be slow, left side is full of either black and fluid or of coagulated blood. The arterial system is empty. The liver and kidneys, vessels of head and veins of the neck usually are congested. The lungs are gorged and frequently portions of them are oedmatous and there is a bloody foam in the mucous membrane of the bronchial tubes. The pleura and other serous membranes are ecchymotic. As a rule an odor of Hydrocyanic Acid exists everywhere, unless concealed by putrefaction, by tobacco, onions, or a strong smelling ethereal oil. The odor of Hydrocyanic Acid may be noticed in the stomach or other parts of the body in some cases, or it may be absent in the stomach and present in other parts of the body. Sometimes the bile is found to be of a deep blue color and the blood black, fluid, or coagulated, and the odor of Hydrocyanic Acid easily recognized. There may be turgescence of the vessels of the brain and an effusion into the ventricles. Casper and Blyth recommend that the head be first opened and examined to perceive the odor in the brain, where, if present, it may longer be detected than in the abdominal and chest cavities, owing to the earlier putrefactive changes in the latter. No inflammatory change in the stomach mucous membrane would be expected in poisoning by **Bitter Almonds,** yet eroded, inflamed patch found in one case.

Cherry Laurel Water.

The stomach is very red. One case showed intense congestion everywhere.

ACID OXALIC.

The mucous membrane of the mouth, pharynx and esophagus is usually soft or brittle, white, shriv-

eled and easily removed. The surface of the esophagus may appear brown and raised in longitudinal folds. The stomach is frequently contracted, containing a highly acid, brown, jelly-like liquid, mainly consisting of altered blood; if death be rapid, the mucous membrane may be soft and pale, but if delayed is usually black in some parts of it and in other parts greatly congested, in rugae, with some portions peeling off in patches and the underneath coats gangrenous. Actual corrosion and perforation is however rare, although the stomach may be too softened to remove entire. The intestines are usually much congested and contracted more or less throughout their whole extent if death was not prompt. The blood is fluid in all parts of the body, except the esophagus and stomach. As a rule the lungs are congested. Occasionally the brain is found to be congested. The kidneys are usually dark and full of blood; may show a fine striping corresponding to the canaliculi; the whole boundary layer may be colored white, due to a deposition of Calcium Oxalate. The urine is albuminous and contains hyaline casts and deposits of oxalates. Sometimes there are no abnormal post mortem appearances.

ACID OXALATE OF POTASH.

The pathological changes by the Acid Oxalate of Potash are identical with those of Oxalic Acid in both the esophagus and stomach. These parts are almost always more or less inflamed or corroded, and the inflammation may have extended into the intestines. As a rule the stomach while not actually eroded is unnaturally transparent.

ACID TARTARIC.

Intense inflammation of the stomach and intestines.

ACONITE AND ACONITINE.

No characteristic lesions. May be more or less congestion of lungs and liver and general venous congestion. The brain and its membranes frequently are injected and the stomach and intestines reddened; there is more or less dark and fluid blood in the right side of the heart. The blood is as a rule fluid. There is a fullness of the large veins. Sometimes the body is of a marble-like paleness.

ALCOHOL.

Remarkably good preservation and persistent rigidity of the body, as a rule. The mucous membrane of the stomach may be fiery red with patches of a deeper hue; it may be bright red, dark red, brown or pale, but often it is deeply congested and has the odor of alcohol; gastric vessels injected and may present form of a tree with branches—an *arbor mortis*. Lungs, brain, cerebral vessels and membranes, right side of heart, and the great veins of the neck are more or less congested. The pia full of blood, engorgement of sinuses and plexus. Serum is often found in the ventricles. The blood usually is dark and fluid. The great veins of the abdomen are full of blood and in prolonged coma the bladder is distended with urine. Sometimes there are burn-like blebs on the extremities. As a rule the pupils are dilated. The right side of heart is empty. Death by Methyl, skin dark.

ANTIMONY — TARTAR EMETIC.

Usually signs of inflammation of mucous membrane of stomach and intestines, sometimes extending to esophagus and throat. Ulcers and pustules have been found upon the mucous membrane of the mouth. Stomach and intestines usually coated with mucus and signs of inflammation may be absent. The blood is thinner than usual. The brain is, as a rule, congested, and the viscera may be engorged with blood. Lungs generally exhibit signs of emphysema and there may be effusions into the pleura.

ARSENIC.

As a rule the body is remarkably well preserved, putrefaction being most delayed in those organs which contain Arsenic. The antiseptic properties of Arsenic permit of the recognition of the inflammatory changes several months after death. But **putrefactive** changes may produce quite similar redness in a healthy stomach. In acute Arsenic poisoning with diarrhœa, the blood may be thickened and all the organs will present a very dry appearance. In the narcotic form of poisoning the vessels of the brain are usually very plain. The characteristic lesions usually found in Arsenical poisoning are inflammation of the stomach and intestines and a fatty degeneration of the heart, liver and kidneys, with infiltration of the epithelial cells. In acute cases the stomach is most affected. In chronic cases the whole alimentary canal presents an inflamed and ulcerated appearance, particularly the duodenum and rectum. Sometimes the tongue is greatly swollen.

The Stomach: The stomach may be empty or it may contain blood mixed with mucus. It may be contracted and the inner lining corrugated, or the whole interior may show streaks of severe congestion or be of a light-red or brownish color. Sometimes the congested patches are thickened: they may be covered with a false membrane mixed with particles of Arsenic. It is common to find an extravasation of blood into the mucosa. Although the poison be absorbed by the skin or otherwise, there are usually evidences of acute gastritis. Frequently there are thick, pasty, whitish-gray, or green (from Paris Green) patches, usually surrounded by brightly injected membrane, where particles of solid Arsenic adhere to the walls of the stomach; yellowish streaks from formation of Arsenic Sulphide. Hemorrhagic spots may be eroded by gastric contents. The stomach may appear white externally but show a softened and ulcerated condition internally.

The Intestines: Usually similar but less severe

inflammation in this part of the alimentary canal. Congestion and inflammation of the whole intestines may be present. Unless the patient has lived for some days after taking the poison, the large intestine is usually unaffected. Sometimes Peyer's patches, the solitary lymph nodules, and the mesenteric nodes are found to be swollen.

The Tongue, Pharynx and Esophagus: They may be more or less inflamed. The esophagus streaked in dull or bright red patches or even corroded.

The Heart: If death is sudden the heart is usually unchanged; if otherwise, shows evidences of fatty degeneration. The walls of the heart are pale, yellowish, and unnaturally yielding. Ecchymosis of muscular tissue under the endocardium and usually on the left ventricle, the posterior walls or the intraventricular septum of the heart.

The Liver: It may be enlarged, as is usual after sudden death. Sometimes marked symptoms of fatty degeneration. In subacute cases fatal results are as much due to inflammation of liver and kidneys as to the poisonous effects produced in the stomach.

The Kidneys: Enlarged, soft, and pale. Upon section, microscope shows a general or streaked yellowish-gray color and a thickened cortex.

BELLADONNA AND ATROPINE.

Usually no very characteristic appearances. The eyes dilated and brilliant and the cerebral vessels and lungs congested, are the chief points. Tongue may be red and mucous membrane of stomach and small intestines injected. If Belladonna berries were eaten, the mucous membrane of the tongue may be purplish. Sometimes there are no post-mortem effects observable.

BROMINE.

Interior of stomach coated with thick, black layer and mucous membrane greatly congested. Exterior of stomach may be injected. Stomach contents generally thick reddish and give forth odor of Bromine. The viscera in the vicinity of the stomach may be a deep yellow color. The peritoneal coat of the duodenum is usually injected.

CANTHARIDES.

Mucous membrane of the stomach and intestines is intensely inflamed. Inflammation of the mouth, esophagus, throat, ureters, kidneys, and bladder. The mouth is swollen. The tonsils may be ulcerated. May be purulent matter covering the mucous membrane of the intestines. Sometimes congestion of the brain. When the powder has been taken, can recognize the shiny green particles in the stomach and intestines. Blood and fatty epithelial casts and pus in the urine.

CARBON MONOXIDE — COAL GAS.

Often rose-red or bluish-red, irregularly shaped patches on face, neck, chest, abdomen or inside of thighs, but not on the back. Due to paralysis of small arteries of skin, which arteries consequently become injected with the changed blood, it is said. Blood is fluid generally and peculiarly red with a bluish tinge. Face calm, pale, and as a rule no foam on the lips. Right heart usually filled with blood; left contains very little. Usually some of the internal organs are congested. Putrefaction usually greatly delayed. Membranes of brain usually much injected. Sometimes lungs congested or even œdematous with effusion. Sometimes the most congestion is in the abdominal cavity.

CHLORAL.

Odor of drug may be observed. Hyperæmia of brain in some cases. No characteristic lesions.

CHLOROFORM.

Frequently odor of anesthetic perceptible. Rigor mortis persistent. Retarded putrefaction. No characteristic lesions **in death from inhalation.** Bronchial tubes, lungs and vessels of brain may be congested. Heart often found flabby and collapsed. The blood is dark and fluid. The post-mortem appearances when **Chloroform** has been **swallowed** are chiefly a redness of the mucous membrane of the stomach. Epithelium of pharynx, epiglottis and esophagus partly detached, whitened and softened.

CHROMIUM — POTASSIUM BICHROMATE.

The blood thin and black. The stomach inflamed and destroyed or marked with dark-red patches.

COLCHICUM.

Usually inflammation of stomach, intestines, and lungs. May be congestion of pia mater. Sometimes there are no abnormal appearances.

COPPER.

The surface of the body may appear yellowish. The stomach and intestines show signs of inflammation; may be ulcerated. There may be a distinct dirty, bluish-green discoloration of the intestinal mucous membrane, produced by the contact of the Copper. This is a valuable sign when present. Touching with Ammonia intensifies the tint. Particles of Copper may be found adhering to the intestinal coats. The lungs may be congested, the rec-

tum ulcerated. Sometimes the mucous membrane of the stomach and small intestines is thickened and inflamed; may be softened, ulcerated, or even gangrenous. The substance of the liver may be friable and fatty; the kidneys swollen and the cortical substance colored yellow; the pyramids a pale brown and compressed.

DIGITALIS AND DIGITALIN.

No very characteristic lesions. May be inflammation of the mucous membrane of the stomach, and congestion of the brain and its membranes. The blood dark and fluid. Right ventricle and auricle filled with blood; left empty.

ETHER.

If the autopsy is performed soon after death, the odor of the anesthetic is perceptible. The cavities of the heart are filled with dark fluid blood. Usually there is congestion of the brain and lungs.

ERYTHROXYLON AND COCAINE.

There are no very characteristic lesions. There may be congestion of the lungs and other organs and the blood fluid and dark. In acute Cocaine poisoning, hyperæmia of liver, spleen, kidneys, brain and spinal cord have usually been found.

HEMLOCK (CONIUM).

There are no characteristic post-mortem appearances. The blood usually is dark and fluid. There may be congestion of the brain or lungs. Stomach, lungs and brain usually found congested. Intestines invariably healthy.

WATER HEMLOCK (COWBANE).

Stomach red, blood fluid. May be corrosion and perforation of the stomach.

HYOSCYAMUS.

There are no characteristic lesions after death. The brain and its mebranes usually are congested.

IODINE.

Appearances of a corrosive irritant poison. The liver enlarged and congested. The brain may also be congested. Ulcers are sometimes found in the stomach. Lungs natural. The other lesions are such as are usually produced by an iritant poison.

LEAD.

The post-mortem signs are not very distinct. There may be inflammation and contraction of the alimentary canal; the stomach may be whitened. In chronic lead poisoning there is a granular condition of the kidneys; the large intestines may show signs of contraction, and the muscles specially affected present a whitish, flabby appearance. May be a grey-black appearance of the intestinal mucous membrane, due to a deposit of Lead Sulphide. As a rule the stomach contains no unabsorbed poison.

MERCURY — CORROSIVE SUBLIMATE.

Corrosive Sublimate is said to take 2 hours to reach the urine, 4 hours to reach the saliva, and is eliminated from the system in 24 hours. Post-mortem signs are mainly found in the alimentary canal. The mucous membrane of the mouth, fauces and esophagus is softened and presents a whitish or bluish-grey color. Frequently the stomach is

softened, particularly at the cardiac end of it, and portions of it may be destroyed. More or less intense inflammation always present; the mucous membrane often of a slate-grey color and corroded. The stomach coats are sometimes very much blackened, probably resulting from Sulphide of Mercury. The intestines, particularly the cæcum, may present the same appearances. There may be inflammation of the kidneys and bladder, the bladder empty and contracted. There is marked congestion of the kidneys about the Malpighian bodies; the epithelial cells deformed, granular, and more or less destroyed. More or less intestinal inflammation has been caused by Mercuric Cyanide, Mercuric Iodide, White Precipitate, and Turpeth Mineral.

MERCURIC CYANIDE.

Stomach and intestines appear greatly inflamed.

POISONOUS MUSHROOMS.

Stomach and intestines usually inflamed and may be gangrenous. The vessels of the brain are as a rule much congested. The liver is enlarged. Search the stomach for the gills and spores of the mushroom. The spores of the common mushroom are oval and dark slate-colored. The discovery of pink irregular spores, or of rusty brown irregular spores, or of round white prickly spores, would be good evidence that a poisonous mushroom had been eaten. Plain round spores might indicate either edible or poisonous. Identify the fungus.

NUX VOMICA AND STRYCHNINE.

No characteristic appearances. Brain and spinal cord may be congested and considerable blood effused. Blood usually fluid and often very dark. Stomach and lungs sometimes found intensely congested. Heart usually has right side gorged with

blood, sometimes is empty and contracted. Lungs congested. Usually relaxation of body at time of death, but rapid, extreme, persistent rigidity ensues soon after it. Rigidity usually remains for a long time; may disappear within 24 hours or last two months. All these leading symptoms rarely produced except by this poison. Bladder usually contains urine, which should of course be preserved for chemical analysis.

OPIUM AND MORPHINE.

No very certain nor characteristic signs. The blood is as a rule fluid. Stomach and intestines usually appear normal. The peculiar Opium odor may be noticed as soon as the stomach is opened. The vessels of the brain usually found in a turgid state, a serous effusion into ventricles and at the base of the brain. Lungs and other vascular organs may be congested. May be heart clots in both sides of heart and a thrombosis of the pulmonary artery. External surface of body is either livid or pale. Bladder is full of urine. These are, however, not characteristic of death from this poison. Pupils are sometimes contracted, sometimes dilated. Sometimes there is nothing abnormal in the post-mortem appearances, and a pathologist could not in any single case positively determine the cause of death from only the organic appearances.

PHOSPHORUS.

Post-mortem appearances vary according to the form of poison taken, but usually those of a corrosive irritant poison. When the poison is taken in a pure state or dissolved in oil, the esophagus and other portions of the alimentary canal usually show the injurious effects. Rapidly fatal cases exhibit signs of irritant poisoning. If death is delayed there may be a softening of the stomach, a peculiarly

jaundiced skin and ecchymosis beneath pleura, peritoneum, pericardium, and in lungs, kidneys, bladder, uterus, muscles and subcutaneous tissue (probably all due to a rapid disintegration of the blood corpuscles). The lesions in many respects resemble the most aggravated forms of sea scurvy. The visceral cavities may contain bloody fluid. May be luminosity of the stomach or other parts. The liver is usually enlarged, doughy with well marked acini and cells filled with large fat drops. A remarkable, acute, fatty degeneration of the liver, kidneys, heart and other muscles and usually of the walls of the arterioles and capillaries constitute the most marked lesions. The blood is usually dark and fluid, but of a syrupy consistence. The most constant stomach lesion is a granular degeneration of the cells, filling the gastric follicles, thus altering the appearance of the mucous membrane, which becomes white, grey or yellow and thick and opaque. There may be perforation, but usually small circumscribed spots of inflammation, erosion or gangrene. The small intestine may be normal or congested. The heart is usually discolored, empty and contracted, but may contain a small quantity of fluid blood. Phosphorus has caused death without leaving recognized lesions.

POTASSA — SODA — AMMONIA.

The mucous membrane of mouth, throat, esophagus and stomach softened, detached, and chocolate-colored or black in recent cases. Signs of ulceration in esophagus and stomach or intestines, associated with more or less constriction, when death has resulted from the secondary effects of the poison. In some cases of poisoning by stronger Ammonia there may be perforation of the stomach, with congestion and blackening of its mucous membrane.

POTASSIUM CHLORATE.

Blood usually brownish and thickened. Kidneys injected.

POTASSIUM CYANIDE.

The appearances in poisoning by Potassium Cyanide are mainly such as are described under Hydrocyanic Acid, with the addition perhaps of caustic local action. When the poison is taken directly after a hearty meal, there may be no signs of corrosion or even redness, owing to the protection of the stomach by its contents, or the neutralization of the Potassium Cyanide by the acid of the stomach. Erosions of the lips may be caused by a very strong solution of the poison and the caustic effect may be traced in the mouth and esophagus to the stomach and duodenum; but this is not common, the stomach and duodenum only showing the local effects. The mucous membrane is swollen, feels soapy, may be ulcerated, and is colored a deep red or blood-red; its reaction is strongly alkaline; crests of stomach folds may be grayish white. The contents have odor of bitter almonds. There may be ammoniacal odor present. The coloring matter of the blood, dissolved out by the Potassium Cyanide, frequently dyes the upper layers of the epithelium, as a post-mortem effect; this can can be imitated by digesting the mucous membrane of a healthy stomach in a Potassium Cyanide solution. The dose of the poison and the condition of the stomach as regards emptiness, of course, entirely govern the intensity of these changes. Although the stomach may be empty when the poison is taken, a dose just large enough to destroy life may produce but little redness or swelling of it. Inflammatory changes in the larynx may be produced by vomit drawn into the air passages in vomiting. The blood often exhales the odor of the poison, and as the acid may often be distilled from it, some of it should be preserved for analysis.

Essence of Almonds may produce the slight inflammation of the other essential oils, but no erosion, no strong alkaline reaction, nor effects, such as the caustic Potassium Cyanide produces.

POTASSIUM NITRATE.

The contents of the stomach may be mixed or tinged with blood. Interior of stomach and intestinal canal exhibit signs of severe inflammation. Mucous membrane may be detached in places, and there may be perforation.

PTOMATROPINES.

Swelling of pharynx, esophagus and mucous membrane of the stomach. May be venous hyperæmia of brain, lungs and kidneys. There may be injection of intestines and swelling of the solitary and Peyer's patches and degeneration of the heart muscle.

SAVINE.

The capillary and venous systems usually congested. Heart full of blood, particularly on right side. The blood is of a black color. A general plethora of intestinal vessels. Usually more or less inflammation of bowels, stomach and intestinal tract, with congestion of kidneys.

SILVER CYANIDE IN POTASSIUM CYANIDE.

(Counterfeiter's Silver Coating).

Distinct smell of Hydrocyanic Acid. Eyes glistening; pupils dilated; jaws clenched; strong rigor

mortis; cerebral membranes congested; lungs highly congested; bronchial tubes and lung cells filled with frothy mucus; right side of heart full of black fluid blood, left side empty; bladder empty; stomach red. (Death in 40 minutes; autopsy after 32 hours).

SILVER NITRATE.

In rapid poisoning, a blue line around gums; in slow poisoning, a bluish tint of the body. Stomach and intestines show either a white color from the action of the caustic salt, a black from decomposition of animal matters, or an intensely red color, due to inflammation.

TOBACCO AND NICOTINE.

No characteristic signs from Nicotine. Is congestion of liver, brain and lungs. A diffused redness over the mucous surfaces of the stomach and bowels. The heart is empty. Blood dark and fluid. May detect Nicotine in the body a long time after death. Has been found in animals after the lapse of years. Nicotine should be sought in the stomach, lungs and liver.

ZINC.

Zinc Sulphate is apt to produce inflammation. Intestinal tract inflamed and usually congestion of brain and lungs. Mucous membrane of stomach may be much wrinkled. Stomach and intestines contracted.

Zinc Chloride corrodes. A peculiar whiteness and opacity of mucous membrane of mouth and esophagus. Stomach usually corrugated, contracted, opaque, leaden color, leathery and hard. All parts of very acid reaction. Lungs and kidneys congested as a rule. The fluid in the stomach has the appearance of curds and whey. There may be fatty degeneration of various internal organs.

POST MORTEM KEY TO POISON.

Appearance (Post Mortem).	Probable Cause of Death.
Skin: Black in patches	Arsenic, silver.
Skin: Bright-red spots or patches	Coal gas, cyanides, hydrocyanic acid.
Skin: Blue	Carbolic acid, coal gas, nitro-benzol, silver-nitrate. Cyanides.
Skin: Marble-like, pale	Arsenic, aconite (occasionally).
Skin: Hemorrhages into	Phosphorus, poisonous mushrooms.
Skin: Icterus of	Phallin, phosphorus, solanine.
Skin: Papular, pustular or ulcerative alterations of	Alkalies, bromine, carbolic acid, chromates, corrosive acids, ergot, iodine.
Skin: Tan-like and partly necrosed	Bromine.
Extremities gangrenous	Ergot.
Rigor Mortis persistent	Chloroform, nux vomica, strychnine.
Putrefaction: Greatly retarded	Alcohol, arsenic, carbolic acid, chloroform, mineral acids.
Putrefaction: Hastened (no rigor mortis)	Poisonous mushrooms.
Lips and around Mouth: Yellowish or brownish	Carbolic acid, nitric acid, sulphuric acid.
Lips and around Mouth: Whitish	Carbolic acid, oxalic acid, sulphuric acid.
Hair: Greenish	Copper (chronic poisoning).
Hair: Sudden loss of	Arsenic.
Pupils: Contracted	Opium, physostigmine.
Pupils: Dilated	Belladonna, gelsemium, hyoscyamus, scopolamine, stramonium. Alcohol (as a rule).
Muscles, Atrophy of	Arsenic, ergot, lead.
Mouth, Inflammation of	Iodine.
Tongue and mouth inflamed, teeth loose	Bismuth, mercury.
Gums: Blue line on	Lead.
Gums: Dark line on	Bismuth, mercury, silver.
Jaw necrosed	Phosphorus.
Mouth Throat and Stomach: Corroded and softened: Yellow, green or brown	Nitric acid, oxalic acid (occasionally).
Mouth Throat and Stomach: Corroded and softened: Grayish, brownish or blackish	Sulphuric acid.
Mouth Throat and Stomach: Corroded and softened: Whitish	Carbolic acid, chloroform (by mouth), corrosive sublimate, hydrochloric acid, oxalic acid (occasionally).
Mouth Throat and Stomach: Corroded and softened: Chocolate-colored or black	Hydrochloric acid, nitric acid, ammonia, potassa, soda.
Blood: Intensely red	Quick-lime.
Blood: Bluish-red or cherry-red, fluid	Carbon monoxide, cowbane, illuminating gas.
Blood: Brownish and thickened	Arsenic (occasionally), potassium chlorate, nitric acid.
Blood: Black	Savine, tobacco, carbon dioxide, morphine, strychnine, potassium chlorate, hydrogen sulphide.
Blood: Extended coagulation of	Bromine, castor oil beans, mineral alkalies.
Blood: Frothy	Chloroform, ether, hydrogen peroxide.
Blood: Transparent	Various fungi, hydrogen arsenide.
Blood: Very fluid	Carbon monoxide, chloroform, strychnine, morphine, oxalates.

Post Mortem Key to Poison (Continued).

Appearance (Post Mortem).			Probable Cause of Death.
Odor (characteristic); especially noticeable upon opening body.....			Alcohol, amyl nitrite, anilin, acetic acid, arsenic, ammonia, bromine, camphor, carbolic acid, chloroform, chlorine, cyanides, ether, ethyl bromine, hydrochloric acid, hydrocyanic acid, iodine, nicotine, nitrobenzol, opium, phosphorus, rue, savine, tobacco.
Stomach	Contents	Green or bluish green.....	Copper salts, Paris green.
		Yellow or reddish yellow.....	Lead chromate, orpiment, picric acid, potassium bichromate.
		[*also walls*] Turn black when exposed to ammonium sulphide..	Bismuth, copper, lead, mercury.
		Hematic.....	Arsenic, potassium nitrate.
		Luminous in dark.	Phosphorus.
		Contain shining green particles..	Cantharides.
		Gills and spores...	Poisonous mushrooms.
	Walls	White spots.....	Arsenic, carbolic acid.
		Purple-red (mucous membrane).	Zinc.
		Black.....	Corrosive sublimate, acetic acid (near pylorus), oxalic acid (occasionally).
		Red (deep or dark)	Arsenic.
		Yellow stains.....	Arsenic.
		Yellow-brown.....	Iodine.
		Leathery.....	Zinc.
		Wrinkled, contracted	Carbolic acid, oxalic acid, zinc, H_2Cl_2 [(Ridge's).
		Corrugated and thickened.....	Arsenic.
Gastro Intestinal Canal	Contains	Small pieces of wood.....	Matches (phosphorus).
		Leaves..... ..	Aconite, belladonna, hyoscyamus, savine, stramonium, tobacco.
		Fragments of hair-coated seeds.....	Nux vomica.
		Fragments of non-coated seeds.....	Castor oil, hyoscyamus, laburnum, stramonium.
		Mineral particles	Antimony, antimonious sulphide, arsenous oxide or sulphide, metallic arsenic, calomel, chromium preparations, iodine, mercuric oxide.
		Hemorrhagic material.....	Arsenic, baryta, phosphorus.
	Walls and Contents	Acid	Acids, acid salts.
		Alkaline.....	Alkaline earths, caustic alkalies, potassium cyanide.

Post Mortem Key to Poison (Continued).

Appearance (Post Mortem).			Probable Cause of Death.
Intestines	Villi turn black		Silver.
	Walls and Contents of Duodenum, etc.	Yellowish	Nitric acid, picric acid, plumbic chromate.
		Greenish	Cupric sulphate, Paris green, Scheele's green, verdigris.
		Brownish	Bromine, iodine, phosphorus, potassium chromate.
	Large Intestine	Black and ulcerated	Bismuth.
		Dysenteric	Castor beans.
	General contraction of or gray-black mucous membrane		Lead.
	Bluish-green mucous membrane		Copper.
Abdominal Viscera	Yellow patches		Arsenic.
	Red "		Antimony.
	Grayish or blackish patches, and corroded		Mercury.
Liver, fatty			Ammonia, antimony, arsenic, iodine, phallin, phosphorus.
Heart, fatty degeneration of, also of muscles and kidneys			Ammonia, antimony, arsenic, iodine, phallin, phosphorus.
Kidney, rough, grating, sound in cutting			Baryta, lead, mercury, oxalic acid.
Lungs, Œdema of			Morphine, muscarine, nicotine, pilocarpine, etc.
Brain	Odor of peach pits or hydrocyanic acid		Hydrocyanic acid in some form.
	Congestion of		Alcohol, digitalis, etc.

Poisons Commonly Resorted to by Suicides:

Carbolic Acid, Oxalic Acid, Paris Green, Arsenic, rat paste," Chloral, Opium and its preparations, Prussic Acid, Strychnine, Sugar of Lead, illuminating gas, charcoal fumes, etc.; of late, in N. Y., Lysol, Carbolic Acid, illuminating gas, Paris green, Iodin, Corrosive Sublimate; etc.

Photographers are apt to use potassium cyanide for self destruction; hospital attendants, corrosive sublimate; domestic servants, illuminating gas, carbolic acid, lysol, or oxalic acid; physicians, hydrocyanic acid, morphine or other powerful alkaloid. Suicides are apt to take large doses; in homicidal poisonings post-mortem findings often indicate poisonous dose was not large.

CHRONIC POISONING

AND

DRUG HABITS.

PART XII.

CHRONIC POISONING AND DRUG HABITS.

By more or less continued and prolonged use of the various preparations of Alcohol, Opium, Morphine, Chloral, Chloroform, Cocaine, Ether, Paraldehyde, Wormwood, etc., some persons acquire a habit for such poison, and a state of chronic poisoning.

The brain structure is deranged, mental function is more or less seriously disturbed, the vital organs are weakened or actually diseased, and a degeneration of the whole physical economy is induced.

Furthermore, the effects, most unfortunately, are not limited to the individual, but may be transmitted to succeeding generations, producing various brain abnormalities, perversion of morals, and defects of mind.

Of all the various kinds of chronic poisonings, the most important are those by Alcohol, Opium (including Morphine), and Cocaine.

Dr. Kellogg, formerly superintendent of the New York State Asylum, says:

"There are chronic intoxications from poisons intentionally taken, as in the widespread drug habits. * * * In their physiological effects there is a specific difference in poisons as to the prevailing emotional mood excited, but in their pathogenetic relations to insanity they result in maniacal or melancholic states more in accordance with individual and constitutional peculiarity.

Toxic insanity is acute or chronic vesania caused by the

medium of toxic substances acting on the cerebro-spinal or sympathetic nervous system and clinically manifested by motor, sensory, trophic, vasomotor and psychic disorder, varying according to the individual idiosyncrasy of reaction to the toxic agencies which have invaded or been generated in the organism.

In some toxic cases, motor anomalies, in others sensory perversions, and in others intellectual disorder may predominate, according to the vascular areas and nervous tracts involved in the pathological changes initiated by the poison. The cerebro-spinal lesion may give rise to a symptom complex like that of general paresis.

Some of the more common toxic agents which cause insanity are here named and classified:

I. Mineral Poisons and Drugs.—1, Lead; 2, Mercury; 3, Arsenic; 4, Chloral; 5, Bromide of Potassium; 6, Iodoform; 7, Paraldehyde.

II. Vegetable Poisons.—1, Opium; 2, Belladonna; 3, Cannabis Indica; 4, Hyoscyamus; 5, Stramonium; 6, Tobacco; 7, Cocaine; 8, Conium; 9, Erythroxylon Coca; 10, Astragalus Hornii; 11, Secale Cornutum.

III. Intoxicants and Noxious Gases.—I, Alcohol; 2, Ether; 3, Chloroform; 4, Carbonic Oxide; 5, Sulphurous Acid Gas.

IV. Acute Infections and Diseases.—1, Typhoid Fever; 2, Smallpox; 3, Scarlet Fever; 4, Typhus Fever; 5, Diphtheria; 6, Cholera; 7, Puerperal Sepsis; 8, Epidemic Influenza; 9, Purpura; 10, Erysipelas; 11, Bubonic Plague; 12, Lepra Vera; 13, Lessa Humana.

V. Auto-Intoxications.—1, Leucomains; 2, Ptomains.

Some of these toxic agents only act upon special tissues, but most of them deleteriously affect the entire organism, and their evil effects continue long after their elimination from the system."

ALCOHOL — ALCOHOLOMANIA — CHRONIC ALCOHOLISM (CHRONIC ALCOHOLIC POISONING).

By alcoholomania is meant the possession of an overpowering impulse, crave, craze or mania for intoxication by alcohol.

By chronic alcoholism is meant the morbid effect of chronic excess in the use of alcoholic beverages.

The spirit obtained from potatoes is the most injurious of all the alcoholic beverages, owing to the large amount of amyl alcohol (fusel oil) which it contains. Many of the cheap spirits have this as their basis.

SYMPTOMS:

The system gradually undergoes an alcoholization. Nutrition is impaired, the various organs of the body gradually undermined, the natural physiological processes being by degrees converted into pathological ones. The alcohol irritates the stomach and digestive apparatus, and precipitates the pepsin of the gastric juice, inducing heart burn, neuralgia of the stomach, belching, melancholia and various distressing symptoms associated with chronic dyspepsia. The structure of the liver is gradually altered and it becomes enlarged and fatty or contracted and cirrhosed. The kidney is seriously impaired. The heart becomes more or less fatty, hypertrophied, weak, flabby and incapable, so that the patient suffers from palpitations, dyspnœa, "stitches," etc. Frequently the tongue is parched and furred, and the breath foul. There is often persistent and urgent thirst, nausea, flatulence, severe pain in the vicinity of the stomach, loss of appetite, dislike for food, sense of severe coldness or heat, stabbings, twitchings and uneasiness throughout the body. The limbs become enfeebled and tremulous. There is more or less mental degredation, low-spiritedness, indeterminate fears of impending disaster, irritability, cowardliness, cunning, indecision of character, inability to concentrate the thought, violence of temper, untruthfulness and weakness of purpose. The chronic alcholic is a vacant, silly and foolish dement.

The morbid tissue changes produced by the alcohol deprave the brain, intellect and moral sense,

and the anesthetic influence of the alcohol so dulls the perceptive faculties as to make the alcoholic unconscious of the damage being done to his body and mind. Destructive changes, which normally are painful, elicit no complaint from the benumbed senses. Violent acts, even manslaughter, may unintentionally be committed through the inability to estimate or determine the amount of force employed in various physical efforts. An intended friendly tap may thus be delivered with crushing force. Unusually immoral and indecent acts may be committed through an enfeebled, deteriorated and degraded moral sense, dependent upon cerebral and other tissue changes. There is a more or less complete paralysis of will power, mind and morals. Delirium tremens, dementia, mania, epilepsy, or even general paralysis may characterize the progress of the disease.

In beer and other malt-liquor-drunkards, there is more or less tendency to obesity. There is puffing and blowing upon the least exertion, and the movements are more or less sluggish and clumsy. The features become dull and expressionless, the face red or purplish, and the blood vessels in the regions of the eyes and nose enlarged and congested. The skin is blotched, greasy and glistening, the eyes red and moist and the conjunctiva yellowish. Death, frequently, finally occurs from embolism, syncope, or dropsy.

Spirit drinkers incline to emaciation, but ultimately, from ascites or anasarca resulting from cirrhosis of the liver and kidneys and fatty degeneration of the heart, may become quite rotund or large limbed. Their restlessness, imaginings, and disturbed, unrefreshing sleep often induce a highly dangerous resort to opiates or other narcotics. They suffer from delusions of persecution, and some of them experience a sense of double consciousness.

TREATMENT:

Various mysterious chemicals, medicinal preparations and processes, including hypnotism, have from time to time been exploited and claimed to be a specific remedy for chronic alcoholism. The so-called "gold cure" has seemed to prove efficacious in some cases, and a most dismal failure in others. As a rule the best plan to pursue is to commit the alcoholic to some institution where he will be inspired with hope, his will fortified, poisoning discontinued, and his system built up with such tonics as iron, arsenic, cod-liver oil, etc.

ARSENIC — CHRONIC ARSENICAL POISONING.

HISTORY:

Chronic poisoning by arsenic may be caused by arsenical wall papers, candles, artificial flowers, toys, India rubber balls, carpets, advertising and playing cards, floor-cloths, the colored wrappers of some cigarettes, japanned goods, etc.

SYMPTOMS:

Thirst and dryness of mouth; nausea; vomiting; perhaps slimy, bloody diarrhœa; voice rough and harsh; eyes red and smarting; eyelids puffed; appetite lost and a sense of weight or soreness at the pit of the stomach; skin dry, covered with sore spots or scales; disturbed sleep; aching in joints or limbs; there may be spitting of blood, great loss of flesh, and general debility.

TREATMENT:

Remove the cause. Provide plenty of fresh air and various tonics, such as iron, quinine, cod-liver oil, strychnia, etc. A complete change of air and scene often proves of the greatest benefit.

CHLORAL—CHLORALISM.

HISTORY:

Chloralism may be the result of the long continued use of the drug as a sleep producer, to relieve neuralgia or other pain, etc.

SYMPTOMS:

The chief symptoms are a disturbance of digestion, chiefly from the direct effect of the drug upon the mucous membrane of the stomach; an eruption of the skin, dyspnœa, depression, vertigo, insomnia, excitement, volubility, reduction in nerve power, lessened mentality, etc.

TREATMENT:

Prevent the obtaining of the drug, and build up the system. This can ofttimes be best accomplished by placing the patient in a good sanitarium for a time.

COCAINE — THE COCAINE HABIT — COCAINOMANIA—COCAINE INEBRIETY—COCAINISM.

HISTORY:

The dangers and disasters resulting from a protracted or habitual use of cocaine can scarcely be enumerated or estimated. This is probably the most seductive, dangerous and mentally, physically and morally destructive of all the drug habits. Erlenmeyer has denominated cocaine the third scourge of humanity, following in order after alcohol and opium, in this respect. Cocaine fascinates by the promptness with which it relieves all sense of exhaustion, dispels gloom and exhilarates, producing a sense of happiness and well-being which transports at once to a longed-for elysium.

Primarily, the after-effects are scarcely perceptible, but through continual indulgence an intense craving for the drug or its effects is produced.

SYMPTOMS:

The habitué is afflicted with sleeplessness, nervousness, tremulousness, nervous and muscular irritability, illusions of sight and hearing, insensibility to pain, indecision, dyspepsia, palpitation, disinclination to work, avoidance of friends and society, insane jealousy, mistrust, moral perversion, bodily emaciation, decay of mind, etc. When the toxication is frequently repeated there is a tendency to raving insanity.

Regarding cocainism, Superintendent Kellogg, of the State Asylum, says:

"Cocainism develops a reasoning form of mental alienation with change of hallucinations and corresponding delusions, anxious and excitable moods, attaining melancholic states of agitation on withdrawal of the drug, or even attacks of stuporous collapse."

Regarding a comparison of the cocainist with the morphinist and the deleterious effects of cocaine, Professor Berkley, of Johns Hopkins University, in his "Treatise on Mental Diseases," in speaking of drug habits, says:

"Even less than the Morphinist are the Cocaine debauchees to be trusted, inasmuch as their moral rectitude and will power have always suffered severely. * * *

Under the deleterious influence of the continued use of Cocaine, especially when it is superadded to the Morphine habit, the gravest somatic indications may arise. The bodily weight sinks rapidly, even 1-5 to 1-3 of the whole being lost within a few weeks. The skin hangs in folds and has a dirty yellow tint, the countenance assumes a distressed look, muscular weakness and tremor become profound.

As happens in other states of inanition, the reflexes become exalted, cramps make their appearance, there is muscular unrest with tremor, particularly noticeable in the tongue. The symptoms of collapse increase. There is a growing tendency to fainting attacks, with irregularity in the cardiac action, accompanied by profuse sweating and dilatation of the pupils. Sleep is much disturbed. The patients usually retain their appetite and powers of assimilation, but the waste being greater than the supply, rapid

emaciation results. Sometimes from the direct poisonous influence of the alkaloid, sometimes from the continued denutrition of the entire body the person habituated to Cocaine acquires an indubitable insanity, which assumes the customary type of a hallucinatory psychosis. Usually after a short prodromal period of motor unrest, anxiety, mistrust of family or companions, and increasing irritability are noted. Hallucinations which may involve all the special senses, quickly follow. Those of hearing are the most frequent. Obscene language and scolding voices are overheard; vile words are shouted at the sufferers; they hear noises made by thieves in the midnight watches; they are threatened with injury; their most secret thoughts are blazoned forth to the edification of the populace; they are made exhibitions of to the delight of their enemies; the roar of machinery, the clanging of bells, wailings, loud screams, and shrieks of murder are somewhat less frequent. Hallucinations of sight customarily accompany those of hearing. * * * Soon the cocaine sufferer becomes dangerous to himself, his family or the community."

Regarding the prognosis in these cases, Prof. Berkley says:

"This is most gloomy. Even though the patient recover from one attack, he very frequently relapses into his evil habits. In the most favorable cases there ever remains an extraordinary weakness of the will power, with accentuated tendency to relieve the physical and psychical languor, by substituting for the cocaine, alcohol, morphine, antipyrine and other nervines in large quantities."

Although the cocaine habit has in some instances been the result of experimentation or of unwise medication, it usually results from the careless and persistent taking of cocaine as an analgesic, or of taking remedies to cure various ailments, or taking so-called cures for the alcohol or opium habit, which remedies or cures contained cocaine. The attempt to substitute cocaine for alcohol or opium, is as hazardous as it is unsuccessful, the evil only being added to, instead of lessened.

TREATMENT:

The treatment is practically the same as that for morphinism (q. v.). Berkley says:

"Persons addicted to the combined morphine-cocaine habit should be allowed their morphine, at least until the immediate effects of the cocaine have passed away. In chronic cocaine insanity home treatment is rarely admissible, especially as there are nearly always dangerous tendencies."

THE CYANIDES.

HISTORY:

Photographers, electroplaters and gilders frequently suffer from chronic poisoning by the cyanides.

SYMPTOMS:

Headache, dizziness, ringing in the ears, pains in the cardiac region, dyspnœa, nausea, pallid skin, offensive breath, etc.

TREATMENT:

Promptly resort to ammonia inhalations, cold douches, chloride of lime held to the nostrils, etc., etc.

Employ electricity, friction and artificial respiration if necessary.

A mixture of ferrous and ferric sulphates with sodium or potassium hydroxide or carbonate is the best antidote to employ.

ETHER — ETHERISM — CHRONIC ETHER POISONING.

HISTORY:

Ether drinking as a habit was at one time quite extensively practiced in Ireland. It was indulged in by people of all classes and even by children. It was sold in shebeens and groceries, often bartered for poultry and farm produce, being delivered at the doors of the people by hawkers. From a teaspoonful to two or more fluid ounces were drunk at a time by the users. The average daily quantity by the moderate ether-drinker was two drachms three or four times a day.

The habit, in time, extended to England, Scot-

land, France and the United States. Some ether-tipplers inhale it instead of drinking it, thus using about a pint per day.

SYMPTOMS:

Ether-drinking produces mainly symptoms of a purely functional disturbance. There is burning pain in the stomach, digestive disturbances, loss of appetite, and symptoms of acute or chronic gastritis. Insomnia, tremors, pallor, gloom, fear, despair, suspicions, chills, lemon-colored or blue skin, irregular heart action, tottering gait, loss of strength, premature decay, etc., are among the chief symptoms.

TREATMENT:

Isolation, predigested food, soothing gastric treatment, and the general treatment employed in chronic alcholism.

LEAD: — PLUMBISM — LEAD COLIC — LEAD PALSY — WRIST DROP.

HISTORY.

Compositors, house painters, potters, card players, paper hangers, file cutters, electric light workers, japanners, enamellers and others are very apt to be afflicted with lead poisoning.

Some hair dyes and cosmetics, hat linings, or goods whitened with a lead preparation, tea packed in lead, water or beer which has stood for some time in lead pipes, or soda water from lead-topped syphons, spirits which have been in leaden receptacles, wine sweetened with lead acetate, foods from lead-soldered tins, or lead wrappers, or loaf sugar from lead moulds, snuff adulterated with red lead, etc., are sometimes the source of lead poisoning.

SYMPTOMS:

A general sense of ailing, anæmia, dull-colored skin. A blue line at the edge of the gums where they meet the teeth is one of the first and most last-

ing symptoms. It is not found when there are no teeth and shows plainly in those who neglect to clean their teeth. Not found usually on those who attend to them. It is the result of the formation of lead sulphide.

In Lead Colic — "Painters' Colic" — the chief symptoms are a tearing pain in the umbilical region, which, as a rule, is relieved by pressure; the walls of the abdomen are rigid and retracted; there are usually also constipation and other digestive disturbances; there may be lead paralysis or wrist drop in lead poisoning; also cramps in the calves of the legs, in the scrotum and penis in men, in the uterus in women; pain may occur in the joints, particularly those of the extremities.

Other symptoms of lead poisoning are headache, vertigo, insomnia, irritability of mind, anæmia, emaciation, disturbed digestion, anesthesia of portions of body, sexual degeneracy, tearing, burning pain in arms and shoulders, convulsions, etc. In women profuse menstruation or even abortion may occur.

TREATMENT:

Give a blue pill at night, followed by a saline in the morning. Iron, Magnesia, Chloroform, and Potassium Iodide, 3 or 4 times a day, are beneficial. Tincture of Belladonna may be given to relieve the colic. Nourish well, and give Cod-liver Oil, Malt Extract, Hypophosphites, Wine, etc. Faradization and massage are helpful. Strychnine in large doses is beneficial. Employ warm baths frequently.

MERCURY — MERCURIALISM — PTYALISM (SALIVATION) — MERCURIAL TREMORS (SHAKING PALSY).

SYMPTOMS:

In chronic mercurial poisoning there is usually debility, nausea, vomiting, colicky pains, a metallic taste in the mouth; the gums are dark red, swollen

and tender; the teeth adhere; the tongue is furred and swollen and the breath foul; may be hacking cough and spitting of blood.

In ptyalism the saliva is greatly increased in quantity (sometimes as much as 1½ pints secreted in 24 hours).

There may be ulceration of the mucous membrane of the mouth, a skin eruption, and even periostitis; later there may be mercurial tremor, paralysis, or convulsions. The mercurial tremors of those engaged in handling mercurial compounds or exposed to the fumes of mercury, affect first the upper extremities and gradually the whole body. Co-ordination power is lost and the movements are erratic; ultimately result in mania and imbecility.

[Salivation is sometimes produced by Antimony, Bromine, Lead, Hydrocyanic Acid, Nux Vomica, Gold, Cantharides, Digitalis, Conium, Belladonna, Opium, and especially by Potassium Iodide. Great fetor of breath and painful sponginess of gums is peculiar to mercurial salivation, and in case of doubt the saliva should be examined for mercury].

TREATMENT:

Tonics, fresh air, albumin, port wine, chlorate of potash, gargles, plenty of good food, and perhaps small doses of Potassium Iodide, comprise the best treatment.

OPIUM AND MORPHINE — THE OPIUM HABIT — THE MORPHINE HABIT — OPIOMANIA — MORPHINOMANIA — CHLORODYNOMANIA — ETC.

HISTORY.

Opiomaniacs and morphinomaniacs by long-continued habitual misuse of these drugs are enabled to take enormous doses of them without the effects proving immediately fatal. Various devotees have

been known to average such large quantities, daily, of one or the other, as the following: Opium, 30 grains; an ounce or more of Tincture of Opium; of Morphine salts, 8 grains or more. Three ounces of Laudanum daily have been taken for a week or two at a time by a young woman habitué; another woman drank 1¾ ounces daily for 7 months; still another woman drank of a mixture of Laudanum, Spirit of Chloroform and Spirit of Lavender (equal parts), 7 ounces daily; every day for years, an adult, 50 years of age, drank 2½ ounces of Laudanum and 1½ ounces of Paregoric; De Quincey finally took 8,000 to 10,000 drops of Laudanum daily; doses of 20, 40, or 60 grains of Sulphate of Morphine are not rare.

Such surprising quantities as the following have been recorded: The drinking by an adult female of a pint of Laudanum daily; the taking by a man of 150 grains of solid Opium in one day in 30 grain doses; the daily hypodermic injection, in a man, of 60 grains of the Hydrochlorate of Morphine; the taking of a fluid ounce of Chlorodyne (Oil of Peppermint; Prussic Acid and Muriate of Morphine; the Morphine 2½ gr. to the ounce), etc.

It would appear that some children are kept more or less under the effects of Morphine by the use of various soothing nostrums. Mrs. Winslow's Soothing Syrup is said to contain about one-eighth grain of Morphine to the ounce; Godfrey's Cordial about one grain of Opium in two ounces, and Dalby's Carminative one grain in six.

SYMPTOMS.

By the narcotizing, anesthetic influence, of both Alcohol and Opium, sensation is deadened, nervous ability benumbed, the vital powers and intellectual faculties undermined by starvation, resulting in an atrophic physical wasting and a depraved moral sense.

Opium produces so depressant an effect on the

special nerve centres and general nervous system as to cause frequently sterility in women and impotence in men.

The hereditary influence of these drugs is more apparent in alcoholists than in opiumists or morphinists.

Cardialgia is a common symptom where either of these two poisons are heavily indulged in. Opium users, as a rule, take the drug regularly. Alcoholists are apt to be periodical in their excessive use of alcohol. Opium lessens the peristaltic action of the intestines, resulting in constipation, acidity of the stomach, anorexia, deficient digestion, a foul tongue, incontinence of the urine, etc. Cardiac innervation is disturbed, resulting in attacks of false angina pectoris, and pericardial anxiety, producing alarming symptoms of distress.

The opiumist's or morphinist's skin becomes yellow, nails brittle, teeth loosened, a most profound anæmia usually results; furthermore an exceedingly obstinate sleeplessness is encountered in the final stages of chronic morphinism."

The morphine habit greatly depraves both brain and body nutrition. The body gradually emaciates. The higher brain functions undergo serious alteration manifested by loss of self-respect, a tendency to coarseness, baseness, and untruthfulness, to seek questionable associations, and, in fact, a loss of all moral restraint.

Persons addicted to the morphine or opium habit seem incapable of a correct statement of facts or occurrences. Their untruthfulness and deceitfulness are amazing. As McBride declares: "**They misconstrue statements, they habitually misrepresent and misunderstand. If a statement can be given two meanings they will apply the wrong one.**"

Their ability to inspire confidence in their statements, by earnestness, apparent frankness, and impressive solemnity of manner, although, in fact, they are cunningly and deliberately lying, is as mar-

velous as it may prove serious. In this respect some of them are possessed with a most distinct and depraved viciousness, indifferently or even with heartless satisfaction grievously misrepresenting and irreparably wronging innocent persons. And for this they may afterwards show no contrition, either lacking the moral courage to acknowledge their fault or their cerebral degeneration prohibiting their subsequent faithful interpretation of the true facts. They are thus a serious menace to the well-being of not only their own households but to the community in which they live.

As a rule the person addicted to Opium does not exhibit the tendency to violence manifested by so many alcoholists. But owing to the narcotic hold the drug has upon the nervous system, opium users are more difficult to cure than alcoholists.

Dr. Kellogg, formerly Superintendent of the State Asylum, says in his "Text Book of Mental Diseases," regarding the effects of morphinism:

"Morphinism results in amnesic states, affective perversion, irritable, suspicious and fearful delusions, complete moral degeneracy, suicidal impulses lacking force of execution and distressing hallucinations on cessation of the drug, with cramps and vasoparetic states."

Chronic Opium Intoxication is a condition of abandonment to self-gratification and utter indifference to duty and the rights and interests of others, as is confirmed by various authors, as follows:

Regarding the Morphine habit, Berkley says:

"In the mentally robust the most common cause of morphinism is the continued use of the drug for the relief of pain, neuralgias, sciatica, repeated migraines, tabetic pains, rheumatism, hepatic or renal colic, dysmenorrhœa, and a host of other somatic troubles; then, when the pain has ceased, the habit is continued for the pleasurable excitement and feeling of temporary happiness induced by it. * * * In another class of cases the patients are of a neuropathic disposition and have the same craving for morphine as a stimulant that others have for alcohol, ether, or essence of ginger. The neurasthenic, the

hysterical, the hypochondriac, the periodical melancholic or drunkard, all turn to opium for that sense of well-being only attainable while they are under the influence of some pernicious anodyne.

Still another class of morphinists is met with. * * * Persons who have become a prey to grief or despondency * * * as well as those who are sleepless or overworked are too apt to seek the haven of rest and rare sense of mental relief only to be found in the extract of the poppy.

The sleep of the opium habitué is never profound but is broken by the recurring visions which in the dream state are constantly changing. The majority of these are agreeable. * * * [but] may be of a disagreeable nature; innumerable faces float before the eye of the imagination. * * Time is annihilated or increased to an eternity. * * *

The permanent effect * * * is shown in pronounced moral obliquities, and in the resort to any means, no matter how unscrupulous, even actual forgery and theft, to obtain the drug. The idea of any personal responsibility falls to the lowest ebb; thought action, and even the most imperative duties, are shunned. While the largest number of these unfortunates are not insane in the stricter sense of the word, there is always present a certain degree of ethical obliquity, irritability, peevishness and moroseness.

It is never safe to believe the word of an opium eater; he will prevaricate with or without reason, his disposition is uncertain and treacherous, his conscience is obtunded, he is dissolute, and has tendencies to morbid impulses."

And the distinguished author and president of the British Society for the Study of Inebriety, Dr. Norman Kerr, of London, in speaking of the chronic morphinist, says:

"He is harassed by frequent palpitation of the heart, oppressed breathing, cramps in the abdomen and leg muscles, nocturnal pains, fitful sleep with terrifying dreams, trembling and fear at imaginary or real voices. There is an exaggerated sensibility, slight pains seem to be acute agony, resolution is transformed into irresolution, with uncertainty of purpose, confusion of thought, morbid melancholy and despair, anorexia alternating with fitful voracious appetite, general constipation with, it may be, frequent prostrating diarrhœal or dysenteric attacks, salivation, listlessness, and indifference to cleanliness, personal appearance, and the claims of duty. The

moral sense is by and by perverted, so that the person's word cannot be relied on, and the no longer pleasant though necessary opiate oblivion is procured, if it cannot be honestly, by theft, the sale of one's living body, or murder. * * * * Sexual function is in general disturbed. In the female amenorrhœa prevails, in the male impotence, but in both sexes functional normality is gradually recovered on abandonment of the drug. The effects of the cachectic marasmus, which is apt to have a fatal ending, often remains long after abandonment, though in most cases they are in time overcome. Death may supervene in various ways: from some intercurrent malady, opiumists being peculiarly prone to be attacked by some diseases, while apparently almost proof against others; from an overdose taken either intentionally or accidentally; or, at rare times, from the effects of the shock incident on some surgical operation."

McBride, of California, in his most excellent article on "The Morphine Habit," says:

"In respect of the moral qualities the morphinist is a cripple and he will remain so until he regains health, if he ever does, by a slow process of character growth which can only be begun after the drug is stopped and then continued for some time subsequently. The quitting of the morphine habit is, therefore, but part of the cure. Though the patient may have quit the drug, and though he is comfortable without it, the cure is far from complete."

Nearly all morphine or opium habitués will offer some plausible, self-exonerating excuse or explanation for having become addicted to the use of the drug. They very commonly place the blame for having acquired the habit, upon the family physician, if they have such, or upon some remedy given or recommended by a friend. In the vast majority of cases their own deliberate and wanton self-indulgence and dream-state seeking, are the true cause of the habit. McBride sums up the results of his own extended experience and observations, in these cases, as follows:

"It is certainly true of a very large proportion of morphinists that they are people who are originally weak in self-control, and usually, too, they are impulsive and selfish. I have exceptionally been able to verify the common state-

ment of patients that they became addicted to the habit from the drug having first been given by a physician, so that I think many of the statements to this effect are misrepresentations. It seems to me that very many of them are voluntary victims in the sense that they began taking the drugs from precisely the same motive that most alcoholic inebriates begin to drink liquor, that is because they find pleasure in it. As a rule we have in the morphinist as in the alcoholic inebriate, a man who was originally weak in self-control, and strong only in the qualities that thrive on human frailty. The number of these people who have originally some twist in the mental make-up is surprisingly large, for, however talented they may be, and I have found some unfinished geniuses among them, the majority are certainly ill-balanced, unadjustable people, with a genuine talent for selfishness, and who in their constant attempts to make themselves comfortable fall upon the habit that becomes their ruin. The chapter is yet to be written which will fittingly describe the mental peculiarities and moral deficiencies of these people from whom this straggling, ruined army of humanity is recruited. It is not, therefore, probable, indeed it is hardly possible, that such people who in health begin the habit, will, when self-control, always weak, has been further weakened by disease or morbid habit be able to resist the temptation to indulgence. To consider the morphinist cured and ready to go back into the world soon after the use of the drug has been discontinued, is like expecting the typhoid patient to go about his business as soon as the temperature has dropped to normal, ignoring the tedious convalescence and the perils that beset it. The cure of the morphine habit, like the cure of chronic insanity, to be permanent must be carried to a restoration of lost character elements."

TREATMENT:

Of the various methods of cure of the opium or morphine habit, that of more or less rapid reduction of the size of the dose is undoubtedly the most successful and inflicts the least suffering upon the patient. Sudden and complete withholding of the drug is rarely if at all practiced now as a means of cure. The latter course entails severe suffering without any material benefit.

McBride's views are expressed as follows:

"Of the possible methods of cure that of sudden, entire withdrawal is not practiced now as far as I know. Either rapid or slow reduction enables the habit to be broken off with comparatively a small amount of suffering."

Kerr says:

"In the drastic abrupt withdrawal, however, the agonies of the sufferer are so practically unbearable, as a rule, tha only in rare cases has the writer carried out this plan successfully."

The opiumist or morphinist can, except very rarely, only be treated successfully when under perfect control. This is almost impossible in private practice, hence an institution is the proper place for such habitué. There he can be carefully watched, constantly prevented from obtaining the drug, and medicine and nourishment administered according to the indications. Depressed vitality, weak and inefficient circulation, gastric hyperacidity and catarrh, anorexia, nausea, vomiting, various peculiar pains, prostration, sleeplessness, and overwhelming craving for the drug can all be promptly dealt with.

The patient will require tonics, perhaps trional, chloral, hyoscyamus, or some other hypnotic to procure sleep; the hyperacidity of the stomach which not only distresses but also either precipitates or aggravates the insatiable craving for the accustomed drug, calls for the administration of an alkaline carbonate or bicarbonate, such as sodium bicarbonate.

The opium or morphine may be rapidly or very gradually reduced, according to the indications noted by frequent observations, such as are best provided for in an institution. The dosage may fluctuate, in the reduction process, according to the tolerance of the patient's nervous system to the shock of reduction. The final reductions are the least well borne, the system clinging tenaciously to every fraction of usual effect.

The patient should not know how much of the drug he is taking when the reduction is made or the drug altogether discontinued.

A hot bath, massage, rubbing the legs with alcohol and ether, the use of bromides, gentian, nux vomica, strychnine, digitalis, quinine extract of cocoa and coffee are among the beneficial measures to be employed; chloralamid and even codeine may be required. Fresh air and a fair amount of exercise in the convalescent part of the treatment, and a healthful occupation of the mind throughout, are important points. Every case is to a certain extent a law unto itself and will call for the physician's highest skill and persistent patience. Relapses, which may prove permanent, are apt to occur, even after long abstinence perhaps extending over years. Probably the great difficulty experienced of late by habitués in obtaining habit-forming drugs, thereby impelling them to secure medical aid, very materially contributes to permanent relief and a marked reduction in the number of habitués.

Berkley says:

"Comparatively few Morphine habitués are ever broken of their slavery to the alkaloid, and many that recover under treatment relapse in the course of a few months. Especially difficult to treat are those patients who have superadded *Cocaine* or *Alcohol* to the original habit, the combinations inducing new trains of symptoms even more difficult to combat than those from Morphine alone." * * * "Not more than ten per cent. of all cases permanently recover; the remainder relapse within a few months."

PARALDEHYDE — CHRONIC PARALDEHYDE POISONING.

SYMPTOMS:

Constipation, flatulence, muscular weakness tremors, restlessness, feeble, unsteady gait, insomnia, anxiety, discontent, unreasonableness, deficient memory, difficult speech, delusions, hallucinations of sight and hearing, irregular heart action, anæmia and emaciation are the chief symptoms.

TREATMENT:

Discontinuance of the drug, with quieting and tonic treatment are, as a rule, promptly effective in establishing a cure.

PHOSPHORUS — CHRONIC PHOSPHORUS POISONING.

Phosphorus may produce necrosis of the jaw from a periostitis resulting from the slow and continuous action of phosphorus. The periostitis, as a rule, spreads from decayed teeth. The lower jaw is, generally, the one affected.

The remedy for such necrosis is surgical.

SULPHONAL — TRIONAL — CHRONIC SULPHONAL POISONING — CHRONIC TRIONAL POISONING.

HISTORY:

Chronic poisoning by sulphonal or trional are invariably the result of the daily taking of one or the other drug to produce sleep.

SYMPTOMS:

The symptoms are, in many respects, similar. Chief among these are noted frequently, disturbance of digestion, nausea, vomiting, constipation or diarrhœa, noises in the ears, headache, vertigo, mental and physical incapacity, difficulty of speech, unsteadiness of gait, sometimes more or less paralysis, great emaciation, etc.

TREATMENT:

The treatment consists of a discontinuance of the drug, rest, a carefully regulated diet, tonics, massage, etc.

WORMWOOD — ABSINTHE — ABSINTHISM.

HISTORY:

Wormwood combined with alcohol and sometimes adulterated with other noxious substances, and in either case known as absinthe, is an intense poison, rather than a tonic and aid to digestion as many suppose.

Absinthe, at one time so freely used in France, particularly in Paris, and increasingly in other parts of Europe, was undoubtedly one of the greatest curses of the French nation. A reckless absinthe mania is said to have pervaded both rich and poor classes.

The craving for the draught by habitues is most intense, the poison becoming almost an absolute necessity of existence. Its effects on the human brain are very serious.

An alcoholic infusion of wormwood with other plants may be distilled to produce absinthe or as is now more commonly done, alcohol is added to various herb essences with essence of wormwood. (The liquer is also said to be an alcoholic solution of oil of wormwood with a little angelica, anise, and marjoram).

SYMPTOMS:

Absinthe reduces the gastric juice, interferes with digestion and produces a most distressing dyspepsia. The drug is said to produce its effect mainly on the cervical portion of the spinal cord. There is nocturnal restlessness and morning nausea and vomiting; the tongue and hands tremble, there is blindness, stupor, headache, apathetic listlessness, epileptiform convulsions, unconsciousness, falling, foaming at the mouth and throwing the limbs about, etc.

The alcohol of the absinthe relaxes, the wormwood tightens, so that the action of the former is succeeded by that of the latter. Alcohol produces coldness which absinthe increases, so that nervous

chills, unnatural coldness, trembling, nausea and staggering may result from drinking absinthe.

The alcohol has paralyzed the inhibitory power so that the voluntary muscles, urged by the absinthe and unrestrained and uncontrolled, are forced into convulsions of an epileptic character associated with complete unconsciousness. A repetition of the absinthe effect during the alcoholic relaxation is apt to result in confirmed epilepsy. It is said that "the characteristic phenomena of absinthecum—alcohol inebriety—are the epileptic explosion, vertigo, and early delirium." It is also said that "the more concentrated the poison the more pronounced is its local gastric causticity, alcohol being an irritant as well as a narcotic poison." If the poison be freely diluted with water it is more rapidly and completely absorbed, consequently increasing the other toxic properties.

The fascination which absinthe has for the absinthe drinker is intense. Perhaps the mental effect of his indulgence is a sufficient explanation of this. Under its influence he may believe himself to be a participant in the most momentous affairs. A panorama of battling hosts, raging elements, scenes of unrestrained revelry, of the transit of worlds of indescribable beauty and brightness, etc., passes swiftly before his distorted vision. He is lost in admiration and ecstacy, or overwhelmed with the intensity of stormy passions. He lives in another realm, and revels in it. He may be afflicted with terrifying hallucinations.

TREATMENT:

Although some claim that absinthism may be cured by discontinuing the poison and building up the nervous system, there can be no question but that the habit has an exceedingly strong hold upon its victim, greatly injures him, and that it is very difficult to permanently discontinue it.

APPENDIX.

DOSE TABLE.

Showing the **Minimum** and **Maximum Doses** of the Principal and Many New Remedies.

(This table is the result of the author's comparing and averaging the doses stated by the leading American and European authorities).

NOTE 1.—Approximate reduction to Metric doses may be obtained by multiplying Grains or Minims by 6½, giving Centigrams; by multiplying Drachms by 4, giving Grams; by multiplying Ounces by 31, giving *Grams.* It is customary to count 8 teaspoonfuls to the ounce, especially when a graduated medicine glass is used.)

NOTE 2.—The following signs are used to confirm large doses intended to be prescribed in a prescription (2 grains are taken as an example):

By underscoring thus: gr. ij or thus: gr. ii.

By emphasis after, thus: gr. ij ! or !!!

By spelling out the quantity: gr. ij two grains.

By writing after the quantity: gr. ij correct dose.

By writing after the quantity: gr. ij large dose intended.

NOTE 3.—Dr. Young's Rule for finding the fractional adult dose for a child:—

Divide the age by the age plus 12. Thus a child 3 years of age should get $\frac{3}{3+12} = \frac{1}{5}$ of the adult dose.

For children the doses of narcotics should be still smaller and of purgatives larger. At the age of 20 or 21 years the full dose of a medicine is given.

The hypodermatic dose is about ½ that by the mouth. The rectal or vaginal dose about twice that by the mouth.

Author's Rule for child less than one year old:

For his own convenience, the author has devised the following rule, to determine the proportionate dose for a child less than one year old:—To the number of months the child lacks of being one year old add 12, to form the denominator of a fraction the numerator of which shall be 1 (the figure of the full year). This fraction may be considered to indicate the **approximate fractional part of the adult dose** suitable to the required age.

EXAMPLE.—Age 3 months, which is 9 months less than 1 year. $\frac{1}{9+12} = \frac{1}{21}$ of adult dose.

At birth the dose should be usually about **one-half** that computed by this method.

After careful review, the author has adopted, for some of the Newest remedies, doses recommended by Merck & Co., Burroughs, Wellcome & Co., and Parke Davis & Co., for their own very reliable products.

APPORTIONATE DOSE TABLE.

From 20 to 60	years of age	give full dose;	
From 60 to 80	" "	¾ to ⅔	full dose;
From 80 to 100	" "	⅔ to ½	"
From 14 to 20	" "	¾	"
At 14	years of age give	⅔	full dose;
At 12	" "	½	"
At 8	" "	2-5	"
At 6	" "	⅓	"
At 4	" "	¼	"
At 3	" "	1-5	"
At 2	" "	1-7	"
At 1	" "	1-12	"
At 6	months of "	1-16	"
At 3	" "	1-20	"
At birth	give	1-60 to 1-30	"

DOSE TABLE.

Remedy.	Dose. Minimum.	Maximum.
Absinthin	15 to	30 gr.
Acetal	1½ to	3 dr.
Acetanilidum	2 to	10 gr.
Acetonum	5 to	15 min.
Acetum Opii [Black Drop (E)]	5 to	15 min.
Acidum Agaricicum	1-12 to	½ gr.
Arsenosum	1-60 to	1-10 gr.
Benzoicum	5 to	30 gr.
Boricum	5 to	30 gr.
Camphoricum	10 to	30 gr.
Carbolicum	¼ to	3 min.
Catharticum	4 to	5 gr.
Chrysophanicum	⅛ to	10 gr.
Citricum	5 to	30 gr.
Fluoricum Dilutum	15 to	20 min.
Gallicum	5 to	30 gr.
Gynocardicum	½ to	3 gr.
Hydrobromicum Dilutum	½ to	2 dr.
Hydrochloricum Dilutum	5 to	30 min.
Hydrocyanicum Dilutum	1 to	5 min.
Hypophosphorosum Dilutum (10 per cent.)	10 to	30 min.
Lacticum	15 to	30 gr.
Nitricum Dilutum	5 to	30 min.

Remedy.	Dose. Minimum.	Maximum.
Acidum Nitrohydrochloricum	1 to	10 min.
Dilutum	5 to	20 min.
Oxalicum	¼ to	1 gr.
Phosphoricum Dilutum	5 to	30 min.
Picricum	½ to	5 gr.
Salicylicum	5 to	30 gr.
Sulphuricum Aromaticum	5 to	15 min.
Dilutum	5 to	20 min.
Tannicum	1 to	20 gr.
Tartaricum	10 to	30 gr.
Valerianicum	2 to	10 min.
Aconitina (Potent., Cryst.)	1-650 to	1-200 gr.
(Mild Amorph.)	1-60 to	1-20 gr.
Duquesnel	1-400 to	1-100 gr.
Aconitinæ Nitras	1-500 to	1-250 gr.
Adonidin	1-16 to	¼ gr.
Aether	5 to	60 min.
Hydrobromicus	10 to	60 min.
Agaricin	¼ to	1 gr.
Agathinum	5 to	10 gr.
Alantol (Inulol)	1-6 to	½ gr.
Allyl Tribromidum	3 to	8 min.
Aloe Purificata	1 to	5 gr.
Aloinum	1 to	3 gr.
Alumini Hydras	3 to	15 gr.
Aminiformum (Urotropin. Formin)	5 to	20 gr.
Ammonii Arsenas	1-20 to	1-12 gr.
Benzoas	5 to	15 gr.
Bromidum	5 to	30 gr.
Carbonas	3 to	15 gr.
Chloridum	1 to	20 gr.
Iodidum	2 to	10 gr.
Phosphas	5 to	20 gr.
Picras	⅛ to	½ gr.
Salicylas	2 to	20 gr.
Valerianas	1 to	5 gr.
Ammonol (Ammonium Phenyl Acetamid)	3 to	20 gr.
Salicylas	4 to	8 gr.
Amyl Nitris	¼ to	1 min.
Amyleni Hydras	15 to	90 min.
Amylum Iodatum	3 to	30 gr.
Analgen	2 to	15 gr.
Anarcotina (Narcotin)	1 to	3 gr.

Remedy.	Dose. Minimum.	Maximum.
Anemonin	⅛ to	¾ gr.
Antifebrin	2 to	10 gr.
Antikamnia	4 to	10 gr.
Antikol	3 to	10 gr.
Antimonii et Potassii Tartras	1-20 to	⅛ gr.
Oxidum	1 to	2 gr.
Sulphidum Purum	¼ to	1 gr.
Antimonium Sulphuratum	1 to	2 gr.
Antipyrinum (Phenazonum, B. P.)	2 to	20 gr.
Antisepsin (Asepsin)	3 to	10 gr.
Antispasmin	¼ to	2 gr.
Antithermin	3 to	8 gr.
Antitoxin (Diphtheria)	5 to	10 cc.
Apiolinum	1½ to	3 gr.
Apiolum	2 to	10 min.
Apiolum (Cryst.)	4 to	15 gr.
Apocodeinæ Hydras	3 to	4 gr.
Hydrochloras	1 to	1¼ gr.
Apocynin	¼ to	½ gr.
Apolysin	1 to	30 gr.
Apomorphinæ Hydrochloras	1-10 to	1-6 gr.
(Hypodermically)	1-30 to	1-10 gr.
Aqua Ammoniæ	5 to	30 min.
Creosoti	1 to	4 dr.
Laurocerasi	5 to	30 min.
Arbutin	2 to	15 gr.
Arecolin	1-20 to	1-16 gr.
Argenti Cyanidum	1-60 to	1-20 gr.
Iodidum	¼ to	1 gr.
Nitras	⅛ to	½ gr.
Oxidum	½ to	2 gr.
Arsenauro	5 to	15 min.
Arseni Bromidum	1-60 to	1-20 gr.
Iodidum	1-20 to	1-12 gr.
Asaprol	3 to	10 gr.
Asparagin	3 to	10 gr.
Aspidosperminæ Hydrochloras	1-50 to	1-30 gr.
Sulphas	1-30 to	1-10 gr.
Aspirin	3 to	15 gr.
Atropina	1-120 to	1-60 gr.
Atropinæ Sulphas	1-120 to	1-60 gr.
Auri Bromidum	1-10 to	1-50 gr.
Auri et Sodii Chloridum	1-30 to	1-10 gr.

Remedy.	Dose. Minimum.	Maximum.
Balsamum Gurjunæ	10 to	50 min.
Baptisin	½ to	5 gr.
Barii Chloridum	1-10 to	1 gr.
Sulphidum	½ to	1 gr.
Benzanilidum	10 to	15 gr.
Benzolinum	3 to	10 gr.
Benzonaphtol	4 to	8 gr.
Benzosol (Benzol-guaiacol, Guaiacol-benzoas)	3 to	15 gr.
Berberina	1 to	10 gr.
Berberinæ Hydrochloras	1 to	10 gr.
Beta-Naphtol	3 to	6 gr.
Betol	5 to	8 gr.
Bismuthi Benzoas	5 to	15 gr.
Benzonaphtolas	15 to	30 gr.
Beta-Naphtolas (Orphol)	5 to	15 gr.
Carbolas (Phenol Bismuth)	5 to	15 gr.
Lactas	5 to	15 gr.
Oxyiodidum (Subiodidum)	5 to	15 gr.
Salicylas	5 to	15 gr.
Subcarbonas	5 to	60 gr.
Subgallas (Dermatol)	5 to	15 gr.
Subnitras	5 to	60 gr.
Tannas (Bismuthan)	5 to	30 gr.
Blennostasin	1 to	4 gr.
Bromalin	30 to	60 gr.
Bromoformum	1 to	10 min.
Bromol	1 to	2 gr.
Brucina	1-12 to	½ gr.
Bryonin	1-6 to	2 gr.
Butyl-Chloral Hydras (Croton Chloral)	5 to	10 gr.
Caffeina	1 to	5 gr.
Citrata	1 to	10 gr.
Effervescens	1 to	2 dr.
Caffeinæ Hydrobromas	½ to	2 gr.
Hydrochloras	1 to	5 min.
Salicylas	1 to	3 gr.
Sodio-Benzoas	2 to	10 gr.
Sodio-Salicylas	2 to	10 gr.
Tri-iodidum	1 to	4 gr.
Valerianas	1 to	3 gr.
Calcii Bromidum	5 to	30 gr.
Chloridum	5 to	20 gr.

Remedy.	Dose. Minimum.	Maximum.
Calcii Glycerophosphas	2 to	5 gr.
Iodidum	1 to	3 gr.
Lactas	3 to	6 gr.
Lactophosphas	3 to	10 gr.
Phosphas Præcipitatus	8 to	20 gr.
Calx Chlorata	3 to	6 gr.
Sulphurata	1-10 to	1 gr.
Cambogia	1 to	4 gr.
Camphora	1 to	10 gr.
Monobromata	1 to	10 gr.
Salicylata	⅓ to	3 gr.
Cannabina (alkaloid)	1 to	4 gr.
Cannabinæ Tannas	2 to	10 gr.
Cannabinon	½ to	1 gr.
Capsicin	⅛ to	¼ gr.
Capsicum	1 to	5 gr.
Carbo Animalis Purificatus	10 to	60 gr.
Ligni	10 to	60 gr.
Cascarine	2 to	3 gr.
Castoreum	10 to	50 gr.
Caulophyllin (resinoid)	½ to	2 gr.
Cerii Oxalas	1 to	5 gr.
Chinoidinum	1 to	30 gr.
Chinol	3 to	5 gr.
Chinolinæ Tartras	5 to	20 gr.
Chloral	5 to	20 gr.
Chloralose	3 to	10 gr.
Chloralamidum	10 to	40 gr.
Chloral-Antipyrin (Hypnal)	15 to	30 gr.
Chloral-Caffeina	3 to	7 gr.
Chloretone	5 to	20 gr.
Chlorodyne	5 to	30 min.
Chloroformum	2 to	10 min.
Chrysarobinum	1-60 to	1-12 gr.
Cimicifugin	1 to	3 gr.
Cinchonina	1 to	30 gr.
Cinchoninæ Salicylas	1 to	30 gr.
Sulphas	1 to	30 gr.
Cinchonidinæ Sulphas	1 to	30 gr.
Citrophen	3 to	15 gr.
Cocainæ Hydrochloras	⅛ to	2 gr.
Salicylas	⅛ to	2 gr.
Codeina	½ to	1 gr.

Remedy.	Dose. Minimum.	Maximum.
Codeinæ Phosphas	⅓ to	¾ gr.
Sulphas	¼ to	1 gr.
Valerianas	¼ to	1 gr.
Colchicin	1-120 to	1-30 gr.
Colocynthin	1-20 to	1 gr.
Coniina	1-60 to	1-30 gr.
Convallamarin	¼ to	1 gr.
Convallarin	2 to	4 gr.
Convolvulin	1 to	2 gr.
Cornutin (Ecboline)	1-20 to	1-10 gr.
Cotoin	½ to	5 gr.
Creatinum	1 to	1½ gr.
Creolin	½ to	5 gr.
Creosotal (Creosote Carbonate)	3 to	15 min.
Creosotum	1 to	3 min.
Cupri Acetas	⅛ to	1 gr.
Arsenas	1-130 to	1-100 gr.
Sulphas	¼ to	10 gr.
Daturina	1-150 to	1-50 gr.
Daturinæ Sulphas	1-150 to	1-50 gr.
Digitalin, German (Merck)	1-16 to	½ gr.
Digitoxin	1-250 to	1-120 gr.
Dionin (Ethyl-Morphine Hydrochlor.)	¼ to	1 gr.
Diuretin (Theobromin Sodio-Salicylate)	5 to	20 gr.
Duboisinæ Sulphas	1-100 to	1-60 gr.
Duotal (Guaiacol Carbonate)	5 to	15 gr.
Elaterinum	1-60 to	1-12 gr.
Elaterium	1-10 to	½ gr.
Emetina, Expectorant	1-120 to	1-60 gr.
Emetic	⅛ to	¼ gr.
Eosote	3 to	5 gr.
Ergotinum, Bonjean	2 to	8 gr.
Ergotole, by mouth	5 to	30 min.
Hypodermic	5 to	20 min.
Eserina (Physostigmin)	1-200 to	1-60 gr.
Eucalyptol	1 to	15 gr.
Eudoxin	5 to	8 gr.
Euonymin	½ to	3 gr.
Euphorin	½ to	3 gr.
Euquinin (Euchinin)	1 to	30 gr.
Exalgine	1 to	3 gr.
Extractum Aconiti	⅛ to	⅓ gr

Remedy.	Dose. Minimum.	Maximum.
Extractum Aconiti Fluidum	½ to	2 min.
Ailanthi Fluidum	10 to	60 min.
Aloes Aquosum	½ to	3 gr.
Apocyni Fluidum	5 to	20 min.
Baptisiæ Fluidum	2 to	10 min.
Belladonnæ Foliorum Alcoholicum	1-10 to	½ gr.
Fluidum	3 to	6 min.
Radicis	⅛ to	¼ gr.
Fluidum	1 to	3 min.
Berberis Vulgaris Fluidum	5 to	30 min.
Boldi Fluidum	1 to	5 min.
Buchu Fluidum	10 to	60 min.
Cacti Grandiflora Fluidum	5 to	10 min.
Cannabis Indicæ	⅛ to	1 gr.
Fluidum	1 to	5 min.
Cinæ Fluidum	15 to	60 min.
Colchici Radicis	½ to	3 gr.
Fluidum	2 to	5 min.
Seminis Fluidum	1 to	5 min.
Colocynthidis	½ to	2 gr.
Conii	1 to	2 gr.
Fluidum	2 to	5 min.
Convallariæ Fluidum	1 to	15 min.
Digitalis	⅛ to	½ gr.
Fluidum	1 to	3 min.
Ergotæ	½ to	8 gr.
Fluidum	15 to	60 min.
Euonymi	1 to	5 gr.
Gelsemii Alcoholicum	¼ to	½ gr.
Fluidum	1 to	5 min.
Glandulæ Suprarenales	3 to	8 gr.
Guaranæ Fluidum	10 to	30 min.
Hyoscyami Alcoholicum	1 to	3 gr.
Fluidum	3 to	10 min.
Ignatiæ	¼ to	½ gr.
Jambolanum Fluidum	10 to	20 min.
Nucis Vomicæ	⅛ to	½ gr.
Fluidum	1 to	5 min.
Opii	⅛ to	1 gr.
Passifloræ Fluidum	5 to	10 min.
Physostigmatis	1-16 to	⅙ gr.
Fluidum	1 to	3 min.
Rhamni Purshianæ Fluidum	10 to	30 min.

Remedy.	Dose. Minimum.	Maximum.
Extractum Rhois Toxicodendri Fluidum....	1 to	15 min.
Scillæ Fluidum	1 to	5 min.
Stramonii	1-6 to	½ gr.
Veratri Viridis Fluidum.....	1 to	5 min.
Viburni Prunifolii Fluidum.....	¼ to	1 dr.
Febralgene	5 to	15 gr.
Fel Bovis Inspissatum	5 to	15 gr.
Purificatum	5 to	10 gr.
Ferratin	4 to	10 gr.
Ferri Albuminas	10 to	20 gr.
Arsenas	1-16 to	¼ gr.
Benzoas	1 to	5 gr.
Bromidum	1 to	5 gr.
Citras	2 to	10 gr.
et Strychninæ Citras.....	1 to	3 gr.
Glycerophosphas	1 to	5 gr.
Iodidum	1 to	5 gr.
Lactas	1 to	3 gr.
Oxalas	1 to	2 gr.
Phosphas	5 to	10 gr.
Pyrophosphas	1 to	5 gr.
Salicylas	3 to	10 gr.
Subcarbonas	5 to	30 gr.
Sulphas	1 to	5 gr.
Exsiccatus	½ to	3 gr.
Valerianas	½ to	2 gr.
Ferropyrin	5 to	15 gr.
Ferrosomatose	15 to	60 gr.
Ferrum Dialysatum	10 to	30 min.
Reductum	1 to	5 gr.
Formin (Urotropin)	5 to	30 gr.
Fuchsin (Rosein)	1-10 to	3 gr.
Gelsemin (resinoid)	⅛ to	½ gr.
Gelsemina (alkaloid)	1-120 to	1-30 gr.
Gelseminæ Hydrochloras	1-120 to	1-30 gr.
Geosote (Guaiacol Valerianas)	2 to	10 min.
Glandulæ Pituitæ	2 to	4 gr.
Prostatæ, Sicc. Pulv.....	¼ to	2 gr.
Suprarenales Sicc. Pulv.....	1 to	4 gr.
Thymi (Thymus Gland)	4 to	10 gr.
Thymi Sicc. Pulv.....	3 to	10 gr.
Thyroideæ Siccæ	1, gradual to	10 gr.
Glonoinum (Nitroglycerin)	1-200 to	1-50 min.
Guaicol	½ to	2 min.
Benzoas (Benzosol)	3 to	15 gr.

Remedy.	Dose. Minimum.	Maximum.
Guaiacol Carbonas (Duotal)	5 to	15 gr.
Salicylas (Guaiacol Salol)	5 to	15 gr.
Valerianas (Geosote)	2 to	10 min.
Guaiamar	5 to	20 gr.
Guaiaperol	4 to	20 gr.
Guaiaquin (Guaiacol Quinin Bisulphonas)	1 to	5 gr.
Guaranin	1 to	5 gr.
Helonin	½ to	3 gr.
Hemalbumen	10 to	20 gr.
Hemogallol	5 to	20 gr.
Hemoglobin	½ to	2 gr.
Hemol	5 to	10 gr.
Heroina	1-12 to	1-6 gr.
Heroinæ Hydrochloras	1-12 to	1-6 gr.
Homatropinæ Hydrobromas	1-120 to	1-20 gr.
Hydrochloras	1-120 to	1-20 gr.
Salicylas	1-120 to	1-20 gr.
Hydrargyri Chloridum Corrosivum	1-80 to	1-10 gr.
Mite	1-10 to	20 gr.
Cyanidum	1-100 to	1-10 gr.
Iodidum Flavum	1-6 to	1 gr.
Rubrum	1-50 to	1-10 gr.
Oxidum Rubrum	1-10 to	1-5 gr.
Salicylas	1-10 to	½ gr.
Subsulphas Flavum (Turpeth Mineral)	¼ to	½ gr.
as emetic for child	2 to	3 gr.
Tannas	½ to	2 gr.
Thymol-Acetas	1-12 to	1-6 gr.
Hydrargyrum cum Creta (Gray Powder)	½ to	10 gr.
Hydrastin (resinoid, eclectic)	5 to	10 gr.
Hydrastina (alkaloid)	1-16 to	½ gr.
Hydrastinæ Sulphas	1-16 to	½ gr.
Hydrastinina	1-16 to	1-6 gr.
Hydrastininæ Hydrochloras	1-16 to	1-12 gr.
Hydrochinonum (Hydroquinone)	5 to	30 gr.
Hyoscina	1-120 to	1-60 gr.
Hyoscinæ Hydriodidum	1-120 to	1-60 gr.
Hydrobromas	1-120 to	1-60 gr.
Hydrochloras	1-120 to	1-60 gr.
Hyoscyamin (resinoid, amorphous)	⅛ to	¼ gr.
Hyoscyamina (alkaloid, cryst.)	1-120 to	1-60 gr.
Hyoscyaminæ Hydrobromas	1-120 to	1-60 gr.
Sulphas	1-120 to	1-60 gr.

Remedy.	Dose. Minimum.	Maximum.
Hypnacetin	3 to	4 gr.
Hypnal	15 to	30 gr.
Hypnone	1 to	7 gr.
Ichthalbin	5 to	10 gr.
Ichthyol	3 to	10 gr.
Infusum Digitalis	1 to	4 dr.
Infusum Sennæ Comp. (Black Draught)	1 to	3 oz.
Iodipin	15 to	60 min.
Iodocaffein	2 to	5 gr.
Iodoformum	1 to	3 gr.
Iodol	½ to	3 gr.
Iodothyrin (Thyrein)	5 to	10 gr.
Ipecacuanhæ	1-6 to	30 gr.
Iridin	1 to	3 gr.
Jalapa	10 to	20 gr.
Juglandin	1 to	5 gr.
Kairin	3 to	15 gr.
Kalagua	¼ to	5 gr.
Kryofine	4 to	12 gr.
Lactophenine	8 to	15 gr.
Largin	5 to	8 gr.
Liquor Acidi Arsenosi	3 to	5 min.
Arseni et Hydrarg. Iodidi (Donovan's Sol.)	1 to	10 min.
Epinephrin Hydrochlor. Adrenalin. Chlorid. (1 to 1,000)	5 to	30 min.
Ferri Chloridi	2 to	10 min.
Iodi Compositus (Lugol's Solution)	1 to	10 min.
Morphinæ Bimeconatis	5 to	40 min.
Opii Compositus (Squibb)	3 to	20 min.
Potassæ	5 to	30 min.
Potassii Arsenitis (Fowler's Solution)	1 to	8 min.
Sodii Arsenas	1 to	8 min.
Lithii Benzoas	5 to	15 gr.
Bromidum	5 to	20 gr.
Carbonas	2 to	10 gr.
Citras	2 to	5 gr.
Iodidum	1 to	8 gr.
Salicylas	5 to	30 gr.
Lobelin	½ to	1 gr.
Lupulinum	5 to	10 gr.
Lycetol	15 to	30 gr.
Lysidin	1 to	5 gr.
Massa Ferri Carbonatis	3 to	5 gr.
Hydrargyri	1 to	10 gr.
Magnesii Glycerophosphas	2 to	5 gr.

Remedy.	Dose. Minimum.	Maximum.
Malakin	5 to	10 gr.
Malarin	5 to	15 gr.
Mangani Dioxidum (Binoxide, Peroxide)	2 to	5 gr.
Hypophosphis	10 to	20 gr.
Sulphas	2 to	5 gr.
Menthol	3 to	5 gr.
Methyl Salicylas	5 to	10 min.
Methylal	2 to	5 min.
Methylene Blue	1 to	8 gr.
Migrainin	2 to	15 gr.
Morphina	1-20 to	½ gr.
Morphinæ Acetas	1-20 to	½ gr.
Hydrochloras	1-20 to	½ gr.
Sulphas	1-20 to	½ gr.
Muscarina	1-30 to	2 gr.
Napellin	½ to	¾ gr.
Naphtalinum	2 to	15 gr.
Narceina	1-6 to	1 gr.
Narceinæ Hydrochloras	1-6 to	1 gr.
Narcotina	2 to	15 gr.
Neosalvarsan (intravenously every 2d day, 4 times)		10 gr.
Nepenthe	5 to	30 min.
Neurodin	5 to	10 gr.
Niccoli Bromidum	2 to	8 gr.
Nicotina	1-20 to	1-10 gr.
Nitroglycerinum	1-200 to	1-50 min.
Nosophen (Iodophen)	5 to	8 gr.
Nuclein	20 to	60 gr.
Oleoresina Aspidii	½ to	1 dr.
Capsici	¼ to	1 min.
Piperis	¼ to	1 min.
Oleum Amygdalæ Amaræ	¼ to	1 min.
Anisi	1 to	5 min.
Anthemidis	2 to	10 min.
Cajuputi	1 to	5 min
Cari	1 to	5 min
Caryophylli	1 to	5 min
Chenopodii	5 to	10 min.
Cinnamomi	1 to	5 min.
Copaibæ	1 to	15 min.
Erigerontis	1 to	10 min.
Gaultheriæ	3 to	20 min.
Hedeomæ	2 to	10 min.
Juniperi	5 to	20 min.

Remedy.	Dose. Minimum.	Maximum.
Oleum Lavandulæ Florum	1 to	5 min.
Menthæ Piperitæ	1 to	5 min.
Phosphoratum	1 to	3 min.
Rutæ	1 to	5 min.
Sabinæ	1 to	5 min.
Santoli	5 to	30 min.
Sinapis Volatile	⅛ to	¼ min.
Tanaceti	1 to	3 min.
Terebinthinæ	5 to	60 min.
Tiglii	½ to	2 min.
Opii Pulvis	¼ to	2 gr.
Opocerebrinum	3 to	6 gr.
Opohepatoidinum	5 to	10 gr.
Opohypophysinum	⅛ to	¾ gr.
Opolieninum	½ to	1½ dr.
Opomamminum	15 to	25 gr.
Opomedullinum	3 to	15 gr.
Opoorchidinum	8 to	12 gr.
Opoossiinum	3 to	15 gr.
Opoovariinum	3 to	12 gr.
Opopancreatinum	3 to	12 gr.
Opoprostatinum	1 to	3 gr.
Oporeniinum	8 to	12 gr.
Oposupranelinum	3 to	6 gr.
Opothymiinum	3 to	8 gr.
Opothyroidinum	¾ to	1½ gr.
Orexin	2 to	6 gr.
Orexinæ Tannas	2 to	8 gr.
Orthoform	5 to	15 gr.
Orphol	5 to	15 gr.
Oxycamphor	10 to	15 gr.
Papain (Papoid)	2 to	5 gr.
Papaverina	⅛ to	¼ gr.
Papayotin	¼ to	1 gr.
Paraldehydum	30 to	60 min.
Pelletierinæ Hydrobromas	4 to	8 gr.
Hydrochloras	4 to	8 gr.
Sulphas	5 to	10 gr.
Tannas	5 to	10 gr.
Pellotina	⅛ to	1 gr.
Pellotinæ Hydrochloras	½ to	1½ gr.
Peptenzyme	10 to	20 gr.
Peronin	⅓ to	1 gr.

Remedy.	Dose. Minimum.	Maximum.
Phenacetinum	5 to	20 gr.
Phenalgin	5 to	15 gr.
Pheno-Bromate	5 to	20 gr.
Phenocoll Hydrochloras	5 to	10 gr.
Salicylas (Salocoll)	3 to	30 gr.
Phenol-Bismuth (Bismuthi Carbolas)	5 to	15 gr.
Phenolid	5 to	10 gr.
Phenosal	5 to	8 gr.
Phesin	8 to	15 gr.
Phloridzin (Phlorizin)	15 to	30 gr.
Phospho-Albumen	5 to	15 gr.
Phosphorus	1-120 to	1-50 gr.
Physostigmina (Eserin)	1-200 to	1-60 gr.
Physostigminæ Salicylas	1-120 to	1-60 gr.
Sulphas	1-120 to	1-60 gr.
Phytolaccin	1 to	3 gr.
Phytoline	5 to	15 min.
Picrotoxinum	1-60 to	1-20 gr.
Pilocarpinæ Hydrochloras	1-60 to	½ gr.
Piperazinum	5 to	10 gr.
Piperidin Guaiacolas	5 to	10 gr.
Piperinum	1 to	8 gr.
Plumbi Acetas	½ to	3 gr.
Iodidum	¼ to	½ gr.
Potassi Acetas	5 to	60 gr.
Arsenas	1-120 to	1-10 gr.
Bichromas	1-12 to	⅓ gr.
Bromidum	10 to	60 gr.
Carbonas	2 to	20 gr.
Chloras	2 to	20 gr.
Ferrocyanidum	5 to	10 gr.
Iodidum	2 to	30 gr.
Permanganas	½ to	3 gr.
Salicylas	5 to	15 gr.
Protopin	40 to	100 gr.
Pulvis Antimonialis (James' Powder)	3 to	10 gr.
Elaterini Compositus	½ to	5 gr.
Ipecacuanhæ et Opii (Dover's Powder)	2 to	15 gr.
Jalapæ Compositus	10 to	60 gr.
Morphinæ Compositus (Tully's Powder)	5 to	15 gr.
Rhei Compositus (Gregory's Powder)	20 to	60 gr.
Quinidinæ Sulphas	1 to	30 gr.
Quininæ Arsenias	⅛ to	1 gr.

Remedy.	Dose. Minimum.	Maximum.
Quininæ Bisulphas	1 to	20 gr.
Ferrocyanidum	5 to	10 gr.
Hydrobromas	1 to	20 gr.
Hydrochloras	1 to	20 gr.
Iodidum	1 to	5 gr.
Sulphas	1 to	20 gr.
Sulphocarbolas	1 to	6 gr.
Tannas	1 to	6 gr.
Valerianas	1 to	3 gr.
Salicylas	1 to	5 gr.
Resina Podophyllii	⅛ to	1 gr.
Resorcinum	2 to	10 gr.
Rubidii Bromidum	2 to	10 gr.
et Ammonii Bromidum	1 to	15 gr.
Iodidum	1 to	5 gr.
Saccharin (Glusidum, B. P.)	2 to	5 gr.
Salacetol (Salantol)	20 to	30 gr.
Salfene	5 to	10 gr.
Salicinum	5 to	30 gr.
Saligenin	5 to	30 gr.
Salipyrin (Antipyrin Salicylas)	5 to	30 gr.
Salocoll (Phenocoll Salicylas)	3 to	30 gr.
Salol	3 to	30 gr.
Salophen	5 to	20 gr.
Salvarsan ("606") (intravenously)		10 gr.
Sanguinarina	1-12 to	½ gr.
Sanguinarinæ Nitras	1-12 to	½ gr.
Sulphas	1-12 to	½ gr.
Santoninum	1 to	5 gr.
Saponinum	½ to	2 gr.
Scoparin	½ to	1 gr.
Scopolaminæ Hydrobromas (Hypoderm.)	1-250 to	1-60 gr.
Sodii Acetas	15 to	60 gr.
Arsenas	1-60 to	1-10 gr.
Benzoas	5 to	60 gr.
Bromidum	5 to	60 gr.
Cacodylas (hypoderm.) 1 gr	(per ora)	3 gr.
Glycerophosphas	3 to	10 gr.
Salicylas	5 to	30 gr.
Santonas	1 to	10 gr.
Sozoidolas	5 to	30 gr.
Sulphocarbolas	5 to	30 gr.
Sulphoichthyolas	3 to	10 gr.
Valerianas	1 to	5 gr.
Solanina	¼ to	1 gr.

Remedy.	Dose. Minimum.	Maximum.
Somnal	15 to	30 min.
Sparteinæ Sulphas	1-10 to	½ gr.
Spiritus Aetheris Compositus	5 to	60 min.
Nitrosi	½ to	2 dr.
Ammoniæ Aromaticus	15 to	60 min.
Camphoræ	5 to	40 min.
Chloroformi	10 to	60 min.
Glonoini	1 to	3 min.
Strontii Bromidum	5 to	20 gr.
Iodidum	5 to	60 gr.
Salicylas	5 to	15 gr.
Lactas	1 to	10 gr.
Strophanthin	1-120 to	1-60 gr.
Strychnina	1-60 to	1-12 gr.
Strychninæ Arsenas	1-60 to	1-12 gr.
Nitras	1-60 to	1-12 gr.
Sulphas	1-60 to	1-12 gr.
Syrupus Acidi Hydriodici	½ to	3 dr.
Allii	1 to	4 dr.
Ferri Iodidi	5 to	30 min.
Ipecacuanhæ	¼ to	6 dr.
Mangani Iodidi	10 to	30 min.
Scillæ	30 to	60 min.
Compositus	10 to	30 min.
Sulphonal	10 to	40 gr.
Svapnia	½ to	3 gr.
Tannalbin	5 to	20 gr.
Tannigen	2 to	10 gr.
Tannopin (Tannone)	3 to	15 gr.
Terebenum	2 to	20 min.
Terpini Hydras	2 to	10 gr.
Terpinol	3 to	5 gr.
Tetronal	10 to	30 gr.
Thallin	½ to	8 gr.
Thallinæ Sulphas	½ to	8 gr.
Tartras	½ to	8 gr.
Thebain	¼ to	1 gr.
Theina (Hypoderm.)	1-6 to	1 gr.
Theobromin	5 to	15 gr.
Theobrominæ Lithium Salicylas (Uropherin)	5 to	15 gr.
Sodio-Salicylas (Diuretin)	5 to	20 gr.
Thermol	3 to	6 gr.

Remedy.	Dose. Minimum.	Maximum.
Thiocol	5 to	20 gr.
Thiol	2 to	10 gr.
Thymol	½ to	2 gr.
Thymus Gland	4 to	10 gr.
Dried, Powdered	3 to	10 gr.
Thyreoids	2 to	5 gr.
Thyroglandin	3 to	5 gr.
Tinctura Aconiti	1 to	5 min.
Fleming	½ to	2 min.
Ailanthi	10 to	120 min.
Baptisiæ	5 to	30 min.
Belladonnæ Foliorum	1 to	20 min.
Berberis Vulgaris	10 to	60 min.
Boldi	10 to	20 min.
Bryoniæ	5 to	30 min.
Cannabis Indica	5 to	60 min.
Cantharidis	1 to	20 min.
Capsici	10 to	60 min.
Catechu Composita	10 to	60 min.
Chloroformi Composita	20 to	60 min.
Cimicifugæ	5 to	60 min.
Colchici Seminis	10 to	60 min.
Conii	5 to	30 min.
Digitalis	5 to	30 min.
Gelsemii	5 to	15 min.
Hyoscyami	10 to	30 min.
Iodi	1 to	5 min.
Ipecacuanhæ	2 to	15 min.
Ipecacuanhæ et Opii (Liq'd Dover's Powd.)	2 to	15 min.
Lobelia	5 to	30 min.
Nucis Vomicæ	5 to	20 min.
Opii (Laudanum)	3 to	20 min.
Camphoratæ (child, 3 to 30 drops)	1 to	4 dr.
Compositus (Squibb)	½ to	1 dr.
Deodorata	3 to	20 min.
Physostigmatis	5 to	30 min.
Simuli	¼ to	2 dr.
Stramonii	5 to	20 min.
Strophanthi	2 to	10 min.
Sumbul	15 to	60 min.
Veratri Viridis	1 to	5 min.
Tolysal (Tolypyrin Salicylas)	5 to	30 gr.
Tribromphenol Bismuth (Xeroform)	8 to	15 gr.

Remedy.	Dose. Minimum.	Maximum.
Trimethylaminæ Hydrochloras	1 to	3 gr.
Tri-nitrinum. See Nitroglycerin.		
Trional	10 to	30 gr.
Triphenin	4 to	15 gr.
Tuberculin (Koch)	1-250 to	1-60 gr.
Tussol (Antipyrin Mandelate)	1-20 to	8 gr.
Uranii Nitras	¼ to	½ gr.
Urea	15 to	30 gr.
Urethanum	10 to	30 gr.
Uropherin	5 to	15 gr.
Urotropin (Aminoform)	5 to	30 gr.
Veratrin (resinoid)	⅛ to	½ gr.
Veratrina	1-60 to	1-10 gr.
Vinum Antimonii	1 to	20 min.
Colchici Radicis	5 to	20 min.
Seminis	20 to	60 min.
Ergotæ	1 to	4 dr.
Ipecacuanhæ	1 to	60 min.
Opii (Sydenham's Laudanum)	3 to	20 min.
Xeroform (Tribromphenol Bismuth)	8 to	15 gr.
Xylol	5 to	20 min.
Zinci Acetas	½ to	2 gr.
Bromidum	½ to	2 gr.
Cyanidum	1-10 to	1 gr.
Iodidum	½ to	2 gr.
Phosphidum	1-20 to	1-10 gr.
Sulphas	10 to	30 gr.
Sulphoichthyolas	½ to	1 gr.
Sulphocarbolas	1 to	4 gr.
Valerianas	½ to	3 gr.

THE ANTIDOTE BAG.

In addition to materials for an emergency uranalysis, an antidote bag should contain: the arsenic antidote in two solutions, chloroform, ether, magnesia, magnesium sulphate, old oil of turpentine, tannic acid, animal charcoal, zinc sulphate, copper sulphate, ipecacuanha, castor oil, acetic acid, chloral, potassium permanganate, solution of potash, hydrogen peroxide, saponin, tincture of aconite, amyl nitrite pearls, alcohol, brandy, aromatic spirit of ammonia, hypodermic tablets of pilocarpine nitrate, morphine sulphate, atropine sulphate, apomorphine hydrochlorate, strychnine sulphate, digitalin, nitroglycerine. A hypodermic syringe, stomach tube, mouth gag, tongue forceps, fountain syringe, infusion apparatus, catheter, etc.

TABLE OF MAXIMUM DAILY DOSES.

(TOTAL OF SAFETY IN 24 HOURS.) (ARRANGED FROM P. G., MERCK, ETC.)

MEDICINE.	In a Day. Grains.
Acetanilid	60
Acid, Arsenous	1/8
" Carbolic	9
" Hydrobromic, Dil	10 Drachms
" Iodic	18
" Valerianic	40 Drops
Adonidin	1
Agaricin	2
Aloin	10
Amylene Hydrate	120 M. +
Antifebrin	60
Apiol, crystallized (solid Parsley-camphor)	60
Apocodeine	1½
Apomorphine Hydrochlorate	¾
Asparagin	4½
Atropine Sulphate	1/30
Baptisin	20
Benzene (Benzol)	180 M.
Berberine Hydrochlorate	45
Butyl-chloral Hydrate	60 +
Cannabine Tannate	40
Cannabinon	4½
Cerium Oxalate	15
Chrysarobin	¼
Cocaine Hydrochlorate	6
Colocynthin	2
Coniine Hydrobromate	½
Convallamarin	5
Copper Arsenite	1
Cotoin	10
Creosote	15 M. +
Daturine	1/20
Digitalin (French) (Merck)	1/10
Digitalis, Infusion	3 Ounces
" Extract	12
" Tincture	2¼ Drachms
Digitoxin	1/30
Duboisine	1/20
Euonymin (the pure Resinoid!)	15
Fluid Extract: Boldo	45 M.
" " Golden Seal (Hydrastis)	150 M.

TABLE OF MAXIMUM **DAILY** DOSES. (Continued).

Medicine.	In a Day. Grains.
Fluid Extract of Grindelia Robusta	300 M.
" " Kava-Kava (Piper Methysticum)	30 M.
" " Lily of the Valley (Convallaria Majalis)	30 M.
" " Piscidia (Jamaica Dogwood)	225 M.
Fuchsine	12
Gelseminine Hydrochlorate	¼
Guaiacol	8 M. +
Guaiacol Carbonate	30+90
Homatropine Hydrobromate ; or Sulphate	$\frac{1}{20}$
Hydroquinone (Hydrochinone)	30 +
Hyoscine Hydrochlorate	$\frac{1}{100}$ +
Hyoscyamine Sulphate	$\frac{1}{100}$ +
Hypnone (Aceto-phenone)	23
Ichthyol	60
Iodine Trichloride	1¼
Iodothyrine	40
Menthol	30+90
Mercury Bichloride	½
" Cyanide	½
Methylene Blue (Medicinal)	15
Naphtalene	90
Naphtol, Beta-	30
Nickel Bromide	23
Nitroglycerine	$\frac{1}{75}$
Nux Vomica, Extract	3
Opium, Extract (aq.)	5
Paraldehyde	3 Drachms
Pelletierine Sulphate ; or Tannate	75
Phenacetin	75
Picrotoxin	⅓
Piperin	18
Resorcin	150
Salol	150
Silver Cyanide	⅓
" Iodide	2 +
Solanine	7½
Sparteine Sulphate	2
Strophanthin	$\frac{1}{50}$
Sulphonal	120
Terpin Hydrate	45
Terpinol	45
Thalline Sulphate	24
Tincture of Strophanthus	30 M.

+ Means dose may be developed higher.

ARTIFICIAL FEEDING OF INFANTS*

Milk-Mixtures—Bottle Feedings*

Compiled and Charted by ALBERT H. BRUNDAGE, M.D., New York City

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FOR WELL BABIES

AGE DAYS WEEKS MONTHS	Weight.	Maximum quantity (ordinarily) of Milk for a suitable Milk-Mixture. (Provides for 24 hrs.)	Amount of Boiled Water (ordinarily) for a suitable Milk-Mixture (24-hr. Mixture).	Maximum amount of Dextri Maltose for a 24-hr. Milk-Mixture.	Number of Feedings in 24 hours.	Feeding Intervals.	Approximate quantity of suitable Milk-Mixture actually required for one feeding. (Ordinarily)	Quantity of suitable Milk-Mixture to be prepared for 24 hours Feedings.	Approximate minimum number of Food Calories usually required in 24 hours.
	Pounds	Ounces	Ounces	Level Tablespoonfuls	Feedings	Hours	Ounces	Ounces	Calories
(During) First and Second Day	6	4 ½	15	None	7	From 6 P.M. to 6 A.M. Feed Every 4 Hours.	1 to 2	20	330
	7								350
	8								400
	9								385
(During) Third and Fourth Day	5	5	15	None	7		1 to 2	20	275
	6								300
	7								350
	8†								360
(During) Fifth and Sixth Day	5	6	15	¼	7		1½ to 2½	21	275
	6								300
	7								350
	8†								360
From 1 up to 2 Weeks	(5)	(6–10)	(15)	½–1	7	From 6 A.M. to 6 P.M. Feed Every 3 Hours.	2 to 3	21 to 25	(300)
	6	6–11	15					21 to 26	300
	7	6–12	16					22 to 28	350
	8	7–13	17					24 to 30	400
	9†	8–14	18					26 to 32	385
From 2 Weeks up to 1 Month Completing 1st Month	6	9–15	15	1–3	7		2½ to 4	24 to 30	330
	7	10–16	16	2–4				26 to 31	350
	8	11–17	17	2–4				28 to 34	400
	9†	12–18	18	2–4				30 to 36	385

milk-mixture from which to obtain, ordinarily, from bottle (or cup), a suitable
ding. It is not expected that every baby will take all thus provided, nor that a
ginning figures at the respective ages and weights, and are to be increased only
d effects must be considered and some babies may even need more. For a very
n indicated; or for the reverse condition somewhat less, for a time at least.
xiliary food (rusk, toast, zwieback, cereal, etc.) feedings.
e use or incorporation of additions milk in preparing some such auxiliary foods

ndigestion, temporary modification of the provisions of this chart or frequency
ounces of the cream from the dairy bottle before shaking it up, or reducing the

ems able to bear. If the mother of a baby be suffering from a poisoning so as
rt or the use of a dry milk (See Note) mixture should be found serviceable.

From 2 up to 3 Months (3rd Month)	8	12–17	17	3–4	May give milk sugar instead in about ½ the quantity, or cane su	7	Feed fr		4 to 5	29 to 34	440
	9	13–19	19	3–4						32 to 38	450
	10	14–20	20	3–5			Omit 2 A.M. Feeding			34 to 40	500
	11†	15–21	21	3–6						35 to 41	495
From 3 up to 4 Months (4th Month)	9	14–20	20	4 to 6		7			5 to 6	34 to 40	495
	10	15–21	20							35 to 41	500
	11	16–22	20							36 to 42	550
	13†	18–24	20							38 to 44	585
4 to 5 Months	11	17–23	20	4 to 6		6			5½ to 6½	37 to 43	550
	12	18–24	20							38 to 44	540
	13	19–25	20							39 to 45	585
	15	20–27	20							41 to 47	600
5 to 6 Months	13	20–26	19	4 to 6		6 (or 5)			6 to 7	39 to 45	650
	14	21–27	18							39 to 45	630
	15	22–28	16							38 to 44	675
	16	23–29	14							37 to 43	640
6 to 7 Months	14	22–28	16	4 to 6		5	Feed every 4 Hours. May Omit Late Evening Feeding.		7 to 8(a)	38 to 44	700
	15	23–29	14							37 to 43	675
	16	24–30	12							36 to 42	720
	17	25–32	10							35 to 42	680
7 to 8 Months	15	24–30	13 (–10)	4 to 6		5			7 to 8(b)	37 to 42†	750
	16	25–31	12 (–9)								720
	17	26–32	10 (–8)								765
	18	27–32	10 (–8)								720
8 to 9 Months	16	32†	10 (–8–0)	(s)6 to 3		5 (or 4)			8†(c)	32†	800
	17										765
	18										810
	19										760
9 to 10 Months	17	32†	8 (–0)	6 to 3		5 (or 4)			8†	32†	850
	18										810
	19										835
	20										800
10 to 11 Months	19	32†	6 (–0)	4 to 2		5 (or 4)			8†	32†	950
	20										900
	21										945
	22										880
11 to 12 Months (One Year Old)	20	32†	4 (–0)	2 to 0		5 (or 4)			8†	32†	1000
	21										945
	22										990
	2†										960

EXPLANATORY

* This chart provides for furnishing the ordinary well baby, at the respective age and weight, amount of food for his "wants and needs" within 15 (or at the most 20) minutes of actual feeding, baby who does, should, or at least always should. The lower figure for milk to make the milk-mix ½ to 1 oz. daily until a well-borne fairly strong mixture within the higher figure is taken. Digestiv "heavy," large-boned or "solid" baby the required calories at a given age might well be greater

(a) May be desirable to use "top milk" (gravity cream)—a richer mixture. (b) Ma

(c) May gradually require an additional quantity of the milk-mixture for free use on auxiliary f as custard, junket, whey, etc.

For sick babies—those suffering from a toxicosis intoxication or poisoning of any kind or fro at least as to quantities perhaps in strength or the substitution of weak gruel or broth or skimming amount of sugar used in the milk-mixture for a time may be necessary.

The return to these normal feedings should be gradual in quantity if not in strength and as t be unable to nurse her baby, or for any other reason, bottle-feedings are required, the provisions

CHEST MEASUREMENT AND HEIGHT RANGE OF BOYS AND GIRLS

Compiled by ALBERT H. BRUNDAGE, M.D., by comparing and averaging the reports and opinions of various leading American writers and observers.

BOYS			GIRLS		
Age	Height Range (Ordinary extremes from shortest to tallest at respective age)	Chest Circumference	Age	Height Range (Ordinary extremes from shortest to tallest at respective age)	Chest Circumference
Years	Inches	Inches	Years	Inches	Inches
5	7	22¼	5	7	22
6	10	23¼	6	10	23
7	13	23¾	7	13	23¼
8	12	24½	8	12	23¾
9	11	25	9	11	24½
10	13	25¾	10	12	24¾
11	15	26¼	11	15	25¾
12	12	27	12	15	26¾
13	16	27¾	13	16	28
14	19	28¾	14	16	29
15	..	30	15	..	30½

HEIGHTS AND WEIGHTS OF BOYS AND GIRLS, 2 to 16 YEARS OF AGE

Compiled by ALBERT H. BRUNDAGE, M.D., by comparing and averaging the reports and opinions of various leading American writers and observers.

BOYS			GIRLS		
Age	*Height* General Average	*Weight* General Average	*Age*	*Height* General Average	*Weight* General Average
Years	Inches	Pounds	Years	Inches	Pounds
2	33½	27	2	32½	26
3	37	32	3	35½	31
4	39	36	4	38½	35
5	41½	41	5	41	40
6	44	45	6	43¼	43¼
7	45½	49	7	45¼	48
8	47½	53½	8	47¼	52½
9	49½	59½	9	49¼	57¼
10	51½	65½	10	51¼	63
11	53½	71	11	53¼	69½
12	55½	78	12	56	80
13	57½	85	13	58¼	90
14	60	96	14	60	99
15	62½	107½	15	61¼	107
16	65	121½	16	61¾	112½

KEY TO URANALYSIS.

(For exclusion purposes in toxicological investigations.)

Fresh Normal Urine: Amber-colored, transparent, aromatic odor, bitter saline taste, acid reaction, specific gravity, 1018 to 1022. Consists "chiefly of a solution of urea and certain organic and inorganic salts, holding in suspension epithelial cells and mucus." Composition not constant, but influenced by amount of water and other fluids taken, by temperature of skin, by emotions, local or general blood pressure, by amount of work done, time of day, age, sex, medicine, etc. (Condensed from Bartley.)

CLEAR LIQUID PORTION OF URINE.

(Adapted by the author.)

If urine dark colored and specific gravity high, it indicates urea, uric acid or blood; if urine light colored, indicates sugar. When specific gravity is more than 1025—

If gives crystals with nitric acid, indicates urea.

If gives reaction by Trommer's test or fermentation, indicates sugar.

If is neutral or feebly acid, precipitates on boiling and precipitate is soluble in nitric acid, indicates earthy phosphates. If this last precipitate is not soluble in nitric acid, indicates albumin.

If hydrochloric acid gives needle-shaped crystals, indicates hippuric acid.

If is high colored and boiling produces coagula, indicates blood.

If gives red color with hydrochloric acid, indicates excess of coloring matter. (Urorrhodin.)

If color changes upon adding nitric acid (iridescent), indicates bile.

URINARY DEPOSITS. (Bartley).

Chemical Examination.

Draw off a portion of the sediment with a pipette or glass tube, and transfer to a watch-glass or small test-tube.

- **White Deposit.**
  - Dissolves on heating urine . . . . . *Ammonium urate.*
  - Insoluble on heating.
    - Sol. in NH_4OH, ... *Cystin.*
    - Insol. in NH_4OH,
      - Soluble in acetic acid, *Earthy Phosphates.*
      - Insoluble in acetic acid, *Calcium oxalate* or *oxalurate.*
    - Gelatinizes in NH_4OH, *Pus* (see above).
- **Deposit is Crystalline.**
  - Urine, Acid.
    - Yellow, cross or whetstone shaped, or in groups, *Uric acid.*
    - Regular octahedra, envelope-shaped, . . *Calcium oxlate.*
    - Hexagonal plates, soluble in NH_4OH (white), . *Cystin.*
    - Bundles of needles crossing each other, ... *Tyrosin.*
  - Alkaline Urine.
    - Large prisms, soluble in acetic acid (coffin-lid shaped), *Ammonium magnesium phosphate.*
    - Brown, double spheres, spiculated, *Urate of ammonium.*
    - Club-shaped crystals, single or in groups, *Calcium phosphate.*
    - Double spheres, radiated structure soluble in acetic acid with effervescence, *Calcium carbonate* (rare).
    - Double spheres, insoluble in acetic acid, *Calcium oxalurate* (rare).
    - Double spheres, yellow or red, striated, . . *Uric acid.*
- **Cellular Elements.**
  - Red or yellow discs, biconcave; sometimes irregular in outline, *Blood-cells.*
  - Granulated corpuscles. With diluted acetic acid, show 3 to 5 nuclei,
    - Albumin present, ... *Pus.*
    - Albumin absent, *Mucous corpuscles.*
  - Round, conical, or flat cells with one nucleus, *Epithelium from urinary tract.*
  - Tadpole-shape, with long tail (small), ... *Spermatozoa.*
  - Cylinders, parallel margins, clear, granular, or containing, epithelial cells or blood-cells, . . . *Casts of uriniferous tubules.*
  - Fungi, yeast, hairs, threads, etc., etc. . *Extraneous matters.*

KEY TO URANALYSIS. (Continued.)

Colored Deposit.

- Visibly crystalline (red), ... *Uric acid.*
- Amorphous,
  - Pale, easily soluble by heat, ... *Urates*
  - Deep-colored, slowly soluble by heat, *Acid urates with uroerythrin.*
  - Red, insoluble by heat, alkalies, or acids, . . . *Blood.*

MICROSCOPICAL EXAMINATION.

With a clean pipette draw off a small portion of the sediment, transfer to a clean glass slide, and examine with a ½-in. or ¼-in. objective. A cover-glass may be dispensed with.

Deposit is Amorphous.

- Small granules with spicules on larger granules; vanishes on adding KOH or NaOH . . . . . light = *Sodium urate.* / dark = *Ammonium urate.*
- Permanent on adding KOH or NaOH, *Calcium carbonate* (rare).
- Globules, strongly refracting light, ... *Fat.*

ABNORMAL CONSTITUENTS FOUND IN URINE

(ADAPTED)

"*Albumin.*—Often present in parenchymatous nephritis, Bright's disease, poisoning by certain substances, rheumatism, infectious fevers, after violent exercise, etc.

Sugar.—Present in diabetes; a very small quantity may sometimes be present temporarily after pneumonia, typhus, rheumatism, affections of the brain and spinal cord after excessive eating of carbo-hydrates, etc.

Leucin and Tyrosin.—In acute atrophy of liver, and in poisoning by phosphorus.

Pus.—Present in pyelitis, renal abscess, urethritis, cystitis, prostatitis, or discharge into the urinary canal of a perinephritic, pelvic, or other abscess. May also be of vaginal origin (in gonorrhea).

Blood.—From hemorrhage in urethra, neck of bladder, ureters, kidneys, genital tract, or external sources.

Acetone.—In diabetes, hydrophobia, and certain febrile conditions.

Diacetic Acid.—Mental diseases with excitement, inanition, carcinoma, and particularly diabetes.

Indican.—Minute quantities present in normal urine, but greatly increased by intestinal obstruction, diseases of liver which interfere with bile formation, etc.; also by use of sulphur baths, in Addison's disease, and in early stages of cholera; also in auto-intoxication, and it is said in terminable pregnancy.

Ammonium Carbonate.—Vesical catarrh.

Hydrogen Sulphide.—Sometimes present in albuminous urine from decomposition of albuminous matter within the bladder.

Bile.—Defective bile excretion; jaundice, hepatic congestion and cirrhosis, malarial and other high fevers."

TABLES.

APPROXIMATE MEASURES.

1 minim varies from 1 to 2 drops;
1 fluid drachm equals about 1 teaspoonful (cochlear parvum);
2 " " " 1 dessertspoonful (cochlear medium);
4 " or
½ fluid ounce " " 1 tablespoonful (cochlear magnum);
2 " " " 1 wineglassful (cyathus vinarius);
4 " " " 1 small teacupful or gill; teacup (poculum);
6 " " " 1 ordinary teacupful;
8 " " " 1 coffee cupful (½ pt.), 1 tumblerful;
1 pint " " 1 pound (of water); pound (libra);
2 pints " " 1 liter or kilogram of water.

The number of drops in 20 minims of the following:

	Drops.
Acids:	
Acetic	40
Hydrocyanic	15
Hydrochloric	18
Nitric Dilute	17
Sulphuric	30
Sulphuric Dilute	17
Aether	50
Fowler's Solution	19
Oils:	
Essential oils of vegetables	40
Tinctures: of all vegetables	40
Vinegars	26
Water:	
Distilled	15
Strong water of ammonia	18
Dilute water of ammonia	15
Wines:	
Of Antimony	24
Of Colchicum	25
Of Opium	26

Number of drops will also vary according to size of neck and flange of vessel from which the fluid is dropped.

APOTHECARIES WEIGHT.

20 grains make one scruple;
3 scruples " drachm (60 grains);
8 drachms " ounce (480 grains);
12 ounces " pound (5760 grains).

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1 lb. = 12 ounces = 96 drachms = 288 scruples = 5,760 grains
1 ounce = 8 drachms = 24 scruples = 480 grains
1 drachm = 3 scruples = 60 grains
1 scruple = 20 grains

TROY WEIGHT.

24 grains make one pennyweight;
20 pennyweights " ounce (480 grains);
12 ounces " pound (5760 grains).

AVOIRDUPOIS WEIGHT.

1 lb. = 16 ounces = 256 drachms = 7,000 grains;
1 ounce = 16 drachms = 437½ grains;
1 drachm = 27 3-10 grains.
1 grain Troy = 97-100 grain Avoirdupois.

U. S. OR APOTHECARIES MEASURE.

Pint.	Fluid ounce.	Fluid drachm.	Minim.
Gallon = 8 =	fluid oz. 128 =	fluid drm. 1024 =	minim 61440;
1 =	fluid oz. 16 =	fluid drm. 128 =	minim 7680;
	fluid oz. 1 =	fluid drm. 8 =	minim 480;
		fluid drm. 1 =	minim 60.

WEIGHT OF WATER.

At 60° F. the U. S. fluid ounce of distilled water weighs 455.7 grains. The British fluid ounce 437.5 grains.

COMPARISONS.

1 minim of water weighs 0.95 grain; equals 0.0616 c.c.
1 fluid ounce—wine measure 29.57 c.c.
1 fluid ounce—imperial 28.4 c.c.
1 fluid ounce of water, wine measure at 60° F. equals 437.5 gr.
1 pint—wine measure equals 16 fluid ounces.
1 pint—Imperial (British) equals 20 fluid ounces.
1 quart—wine measure (32 fluid ozs.) equals 58.30 cu. in.
1 quart (imperial) (40 fluid ozs.) equals 69.97 cu. in.
1 gallon (wine) equals 231 cu. in., (imper'l) equals 277.27 cu. in.
1 kilogram equals 1000 grams or 2.7 lbs. Troy.
1 ton—Avoirdupois (2000 lbs. equals 29,167 ozs. Troy.
1 milliliter (mil.) equals 1 cubic centimeter; equals the measure of one gram of water.

METRIC MEASURES.

LENGTH.

1 meter equals ..... 39,368 inches.
1 decimeter equals ..... 3.9368 inches.
1 centimeter equals ..... .39368 inch.
1 millimeter equals .....039268 of an inch.
1 decameter equals ..... 393.68 inches.
1 hectometer equals ..... 3,936.8 inches.
1 kilometer equals ..... 39,368 inches.
1 myriameter equals.....393,680 inches

WEIGHT.

1 gramme equals ..... 15.434 grains.
1 decigramme equals ..... 1.5434 grains.
1 centigram equals ..... .15434 of a grain.
1 decagramme equals ..... 154.340 grains.
1 hectogramme equals ..... 1,543,402 grains.

MEASURE.

1 litre equals 2.113 pints or 15,434 grains. 61.027 cu. in. *
1 decilitre equals 3.381 fluid ounces or 1,543.4 grains.
1 centilitre equals 2.705 fluid drachms or 154.34 grains.
1 millilitre equals 16.231 minims or 15.434 grains.
1 decaliter equals 2.641 Cong's or 154,340 grains.
1 hectoliter equals 26.419 C. or 1,543,000 grains.
1 kiloliter equals 264.19 C.
1 myrialiter equals 2,641.9 C.

*About 34 oz.

METRIC EQUIVALENTS

Troy	Metric gm.	Troy	Metric gm.	Troy	Metric gm.
gr. 1	0.065	gr. 1/16	0.004	gr. 1/100	0.00065
gr. 3/4	0.049	gr. 1/20	0.0032	gr. 1/120	0.00054
gr. 2/3	0.043	gr. 1/24	0.0027	gr. 1/130	0.0005
gr. 1/2	0.032	gr. 1/25	0.0026	gr. 1/150	0.00043
gr. 1/3	0.022	gr. 1/30	0.0022	gr. 1/180	0.00036
gr. 1/4	0.016	gr. 1/32	0.002	gr. 1/200	0.00032
gr. 1/5	0.013	gr. 1/40	0.0016	gr. 1/240	0.00027
gr. 1/6	0.011	gr. 1/50	0.0013	gr. 1/250	0.00026
gr. 1/7	0.009	gr. 1/60	0.00108	gr. 1/300	0.00022
gr. 1/8	0.008	gr. 1/64	0.001	gr. 1/400	0.00016
gr. 1/10	0.0065	gr. 1/75	0.00086	gr. 1/500	0.00013
gr. 1/12	0.0054	gr. 1/80	0.00081		
gr. 1/15	0.0043	gr. 1/96	0.00067		

The above tables give metric equivalents of Troy measures.

To convert grammes into grains	×	15.432
To convert grammes into ounces, avoirdupois	×	0.03527
To convert kilogrammes into pounds	×	2.2046
To convert grains into grammes	×	0.0648
To convert avoirdupois ounces into grammes	×	28.35
To convert troy ounces into grammes	×	31.104
To convert cubic centimetres into U.S.A. fluid ounces	×	0.0338
To convert litres into U.S.A. fluid ounces	×	33.814
To convert fluid ounces into cubic centimetres	×	29.57
To convert pints into litres	×	0.4732
To convert metres into inches	×	39.37
To convert inches into metres	×	0.0254

1 inch equals 2.54 centimeters.
1 foot equals 34.48 "

TEMPERATURE EQUIVALENTS

1°Fahrenheit = 5-9° Centigrade = 4-9° Reaumer. To reduce F. to C., subtract 32 from F. degrees given and divide remainder by 1.8. To reduce C. to F. multiply C. degrees given, by 1.8, and then add 32° to this; or, multiply by 2, deduct 1/10 of this product and add 32.

PULSE TABLE.

Giving Average Frequency at Different Ages (in health).

In the fœtus *in utero*..	between	150	and	140	beats per minute
In new-born infants....	"	140	"	130	"
During 1st year.....	from 130	down to		115	"
" 2d "	" 115	"		100	"
" 3d "	" 105	"		95	"
From 7th to 14th year...	" 90	"		80	"
" 14th to 21st " ...	" 85	"		75	"
" 21st to 60th " ...between	75	and		79	"
In old age.....	" 75	"		80	or more.

The pulse is, as a rule, more frequent *in females,* by 10—15 beats per minute; *during* and *after exertion,* unless long continued; *during digestion* or *mental excitement;* generally, more frequent *in the morning* than later in the day. It is temporarily accelerated after sudden change of posture from the recumbent to the sitting, and from either to the standing position especially during convalescence and in other states where the action of the heart is feeble.

RESPIRATION AT VARIOUS AGES.

	No. Resps. per Min.		No. Resps. per Min.
First year	35	At puberty	20
Second year	25	Adult age	18 to 20

INCOME AND EXPENDITURES OF LIFE.

Income.	Grains.	Expenditure.	Grains.
Solid food	8,000	Lungs give off.....	20,000
Water	37,650	Skin	11,750
Oxygen	13,000	Kidneys	24,100
		Intestines	2,800
Total	58,650	Total	58,650

"The body of a man weighing 148 pounds is made up as follows: Water, 90 pounds; living matter, 26 pounds; fat, 23 pounds; minerals, 8.3 pounds. Food must construct this frame and must repair whatever losses it sustains.

"Nitrogenous foods are obtained from the juice of meat, the white of egg, the curd of milk, the legumen of peas and beans and the gluten of bread. These foods build up the living parts of the body, the cells and tissues. The fats are heat and energy producers. Starches and sugars are energy-makers in a less degree. Minerals form bone and are used by the body in many ways. Water is the most important food."

[Constituents of the body viewed from another angle:—According to the Babylon Leader: "A scientist says each man contains the following ingredients: Fat enough for seven bars of soap. Iron enough for a medium-sized nail. Sugar enough to fill a shaker. Lime enough to whitewash a chicken coop. Phosphorus enough to make 220 matches."—[Nevertheless, some men make a poor match; so do some women.]—"Magnesium enough for a dose of magnesia. Potassium enough to explode a toy cannon. Sulphur enough to rid a dog of fleas. The whole collection is worth 98 cents. Even that is a high price to put on some men."—[Probably a woman would be "worth two cents" more, at least, i. e., an even dollar, as she is commonly assumed to be of a finer nature.—]

INKS

Black Ink usually consists chiefly of a decoction of nutgalls mixed with a solution of copperas; or, of a mixture of gallate or tannate of iron and a few drops of acetic or hydrochloric acid or phenol to prevent precipitation or mold, and a solution of indigo-carmine or logwood extract to insure visibility; perhaps a gum to make it adhere without spreading. If the ink is concentrated, and glycerine, sugar, dextrin, etc., is added (to keep it moist), also much gum, it becomes a copying ink.

Some black inks contain extract of logwood and potassium chromate, or sumac; others contain such blue or violet dye as an indulin (one of the quinone derivatives), or a nigrosin (produced by heating nitrobenze, or a nitrophenol, with an amin substance derived from ammonia); the latter variety, having no sediment, is much used for fountain pens. (Stains by these inks are quite readily removed, as a rule, by solutions of oxalic acid, chlorine or hydrochloric acid; but if India ink has been added, as is done sometimes, they are irremovably fixed). Aniline inks are now much used. The Indelible Inks (for marking clothes; etc.) are: Silver nitrate preparations (not quite indelible; removable by washing, after using potassium cyanide strong solution—very poisonous); an India Ink (Chinese or Japanese Ink) consisting commonly of a mixture of lamp black or burnt cork, gelatine and water; another India Ink is similar, but made from the ink of the cuttlefish, treated with caustic alkalies—a sepia; an ink consisting of a decoction of nutgalls with ammonium vanadate; and an ink, a mixture of gluten (from wheat) dissolved in vinegar and rubbed with lamp black (soot), or with India ink (Chlorine causes this ink to lose its color, but does not remove it from goods or paper). Marking ink for hand bags, etc.: Shellac 3 ozs., resin 8 ozs., dissolved in alcohol 1 pint, by

gentle heat for 14 hrs., while in closed bottle in water-bath. Shake well and stir in Frankfort black, or other color, 6½ ozs.

Blue Ink commonly consists chiefly of Prussian blue (an iron salt combined with a solution of potassium ferrocyanide), with oxalic acid and water in varying proportions; also of a sodium or potassium salt of indigo extract, with water.

Yellow Ink may be produced by boiling saffron, or gamboge.

Green Ink is made, often, by mixing indigo-carmine with picric acid; or use chrome green, or aniline.

Red Ink is made, usually, from the soluble (East India or tropical America) redwoods, or similar dye wood commonly known as Brazil wood. It is prepared by boiling the wood with alum, tartar (from grapes), and water, then adding tincture of cochineal and gum arabic. Sometimes, to make red ink: Brazil wood is boiled with stannous chloride, and gum arabic added; or, Brazil wood, vinegar and alum are combined; or, carmine is dissolved in caustic ammonia (1 to 120) and gum arabic is added.

Printing Ink is composed, commonly, of a mixture of yellow soap, boiled linseed oil, or hempseed oil, lamp black and varnish (or such drier as lead acetate, manganese borate or dioxide, or litharge). To secure other colors of printer's ink: Lead chromate for a yellow ink, vermilion for a red ink, or an ultramarine for a blue or purple ink, may replace the lamp black. Lithographic Ink contains equal parts of soap, shellac, wax, tallow and pitch.

The Sympathetic or Invisible Inks often consist of a colorless vegetable juice, or lemon juice, to be made visible by pressing the writing with a hot iron; milk, visible upon rubbing with soot; or a weak solution made from nutgalls, to be made visible (black or brown) by a solution of copperas; or, a solution of cobalt chloride, with or without nickel chloride, to be made visible by heat—with nickel chloride, turns green; without, turns blue; or, a weak aqueous solution of gold chloride or silver nitrate, to be made visible (blackish or purplish) by exposure to light and the application of heat—these must be kept from the light until time to be read. Solutions of lead acetate and of cobalt salts are used, also.

STAINS

The stain of the ordinary black or blue ink containing iron, or an iron rust, may be removed, usually, from cloth, by using a warm 10% to 20% watery solution of acetic acid mixed with about an equal amount of a (one dram to the pint) watery solution of oxalic acid, then freely washing with water.

Sometimes the stain will yield to the following method: Apply common table salt; then rub with the juice of a freshly cut lemon; then hold it in the steam of a tea kettle nozzle; apply blotting paper to absorb the ink. Repeat the whole process if necessary, and wash freely.

Laundrymen, cleaners, dyers, and others have worked out or confirmed many of the following facts:—(Most of the large city laundries, including, to the author's personal knowledge, his own family's laundry, pursue the same general meth-

ods in removing stains. The whole matter is largely one of familiarity with chemical action, associated with a fair knowledge of fabrics.) Silver nitrate stains are best removed from cotton or linen, by immersing the goods in a saturated solution of sodium hyposulphite (photographers' film-fixing salt), or in Javelle water and then removing the resulting silver chloride with weak ammonia water. From silk and wool the stain may be removed by using sodium or potassium cyanide solution (a dram to the pint) and thoroughly rinsing the fabric with warm water; but the cyanide poison is too dangerous and deadly for ordinary domestic use.

To remove stains of aniline inks, dyes and blueing (from linen or cotton) use Javelle water or Labarraque's solution; or, a potassium permanganate solution (1 oz. to the gallon).

Sodium bisulphite (saturated solution) and powdered zinc oxide (used together but put in separate bags to prevent the sodium settling on and staining the goods) will sometimes remove aniline stains when other measures fail.

To remove such stains (from silk or wool) use the permanganate solution or hydrogen peroxide solution. Javelle water is a strong bleaching agent and should be used, usually, with an equal quantity of hot water. At it will remove the dye from colored goods it should not be used on such articles; and it should not be used on silk or wool as it will destroy the fibers. It will remove stains on cotton and linen resulting from corrosive sublimate mixtures. In using it, the stained part of the article should be immersed in it for a few minutes; the stain should then fade out. The article should then be rinsed in several waters to get out all of the Javelle water; put a few drops of ammonia in the next to the last rinsing, then rinse in much clear water.

The standard washing process of the national laundrymen's organization it appears usually removes aniline stains, ultramarine blueing, indelible pencil (in cotton or linen) egg or other albumin, medicines of an organic nature, grease, grass (in cotton or linen), fruit or tobacco (in cotton or linen), cream and ice cream, mildew, mud, syrup, tea, coffee and some other stains. Stains from medicines containing iron or silver, first treated as of such alone are then best well washed. The standard, and similar washing processes seem to consist mainly of a series of baths, in conjunction with salts and solutions, about as follows: Treatment for Cotton and Linen:—"1st bath: Luke warm water. 2d bath: Hot water and soap solution (25 lbs. soap, 8 lbs. soda ash [washing soda], water to make 100 gals.). 3rd bath: Repeat 2d. 4th bath: Hot water and soda ash. 5th bath: Hot water. 6th bath: Hot water, rinse. (If white goods, add Javelle bath.) 7th bath: Hot water and acetic acid (5% to 20% solution). 8th bath: Hot water, blueing. 9th bath: Cold water, rinse. For Woolens:—Nearly same temperature to be used throughout—1st bath: Luke warm soap bath. 2d bath: Luke warm water; rince. For Silks:—Neutral soap, and water not over 100°F. No soda ash or Javelle water. If white goods, sodium bisulphite, also acetic acid (5 to 20% solution), may be used.

(When a straining substance has been dissolved or loosened by a reagent, it should be absorbed promptly by thick muslin or blotting paper placed in contact with it.) After employing such a washing process as the standard referred to, to remove blood stains, the remaining hemoglobin stain may be removed by Javelle water or ammonia water (1 part of a 10% solution to 9 parts of water), or hydrogen peroxide. After using such washing process to remove ultramarine blueing, any remaining spots of it may be dissolved out by using an oxalic solution (1 oz. to 1 gal. of distilled water). Prussian blue should be removed by clean water. Obstinate stains of cocoa, chocolate, cream or ice cream (in cotton or linen), usually yield to Javelle water; or, to borax and cold water, followed by hot water from a height; (in silk or wool), to hydrogen peroxide. If fruit stain still persists, (in silk or wool), use: Warm water, and acetic acid, or oxalic acid, or potassium permanganate followed by oxalic acid, or sodium bisulphite. For glue, use acetic acid (for cotton and linen); and 50% of ethyl alcohol and same of ethyl ether (for silk or wool). For grease, try to soften stain with lard and oleic acid mixture (oleic acid 2 parts and lard 98 parts); then again wash by standard process (for cotton or linen); (for silk and wool) try strong soap solution or gasoline, carbon tetrachloride, ether, chloroform, or benzene. Try blotting paper with hot iron. For gum or resin try succesively: Turpentine, benzene, carbon tetrachloride, chloroform, alcohol 95%, ether, kerosene, gasoline, carbon disulphide. Carbon tetrachloride will remove chewing gum. Candle or other wax, and paraffin, yield to a hot iron with white blotting paper above and below the goods; if candle was colored, follow by soaking in denatured alcohol.

Stains by fruit, tea, or coffee often yield to a deluge of hot water from a height. For oil stains in paper, apply wet pipe clay for 6 hours; or, Fuller's earth lightly. Restore white of paper with ether. For iodin apply alcohol.

The standard or similar washing process may remove India ink, also printers ink, if lard is rubbed, previously, into the stain. Pure grain alcohol removes phenol stains if applied promptly. Javelle water, or potassium permanganate followed by a solution of oxalic acid, removes remnants of indelible pencil (in cotton or linen), after such as the standard process, 95% alcohol is substituted for Javelle water, if silk or wool goods. Weak ammonia water followed by hot water, or use of chloroform or ether, will remove iodine stains. Paint, tar and varnish stains usually yield to turpentine, benzene, chloroform or carbon tetrachloride. Methlyene, blue, picric acid, etc., stains yield to a weak ammonia solution and washings with water.

IMPORTANT FACTS

Be cautious in giving atropia to flaxen-haired, light-compexioned, nervous women.

Be cautious in the use of morphia subcutaneously after opiates or morphia have been given by the mouth or rectum.

The healthy mucous membrane of the bladder never absorbs medicine; an ulcerated vesical mucous membrane does.

Children are especially susceptible to the narcotic action of opium and its alkaloids.

A catheter should never be *forced* into the bladder. All catheters should be kept perfectly clean. After each using they should be dipped in carbolized oil, washed in warm water, and, if gum elastic, be put away in zinc powder, powdered soapstone, or starch. All soft-rubber articles are rendered hard and brittle by contact with oil or grease. Catheters used in puerperal cases should be rendered thoroughly aseptic.

THE ORDER OF THE ERUPTION OF THE TEETH.

(An aid in determination of age.)

FIRST DENTITION.

As a rule the teeth of the lower jaw precede those of the upper, except in the case of the lateral incisors.

Central incisors	5th to 8th month.
Lateral incisors	7th to 9th month.
First molars	12th to 16th month.
Canines	16th to 20th month.
Second molars	20th to 36th month.

SECOND DENTITION.

First molars	5th to 7th year.
Central incisors	7th to 8th year.
Lateral incisors	8th to 9th year.
First bicuspids	9th to 10th year.
Second bicuspids	10th to 11th year.
Canines	11th to 12th year.
Second molars	12th to 13th year.
Third molars	17th to 21st year.

THE ERUPTIVE FEVERS.

(A table to aid in determining the source of eruption, in suspected, poisoning with eruption.)

Disease—Scarlet Fever (Scarlatina).

Period of Incubation. Four to seven days, or shorter.

Mode of Onset. Sudden; very often at night; sore throat; vomiting; convulsions in severe cases; high fever.

Eruption Appears.—At the end of the first or during the course of the second day.

Eruption Fades.—In three to five days; disappearing first where it first appears.

Danger of Contagion. As long as desquamation continues, or a purulent discharge from the ear or an abscess keeps up;

indefinitely in clothing, toys, books, etc., which have not been disinfected.

Disease—Measles (Morbilli, Rubeola).

PERIOD OF INCUBATION. Four to fourteen days.

MODE OF ONSET. Rather sudden; catarrhal symptoms; moderate fever.

ERUPTION APPEARS. Fourth day; less commonly on the third or fifth.

ERUPTION FADES. In about four days.

DANGER OF CONTAGION. So long as the fine, branny desquamation lasts.

Disease—Rotheln (Rubella, German or French Measles).

PERIOD OF INCUBATION. One to three weeks.

MODE OF ONSET. Gradual, fever slight and transient, sometimes absent.

ERUPTION APPEARS. The eruption usually the first symptom.

ERUPTION FADES. Irregularly; in about four to six days, without desquamation.

DANGER OF CONTAGION. The duration of the liability to communicate the disease is not known.

Disease—Smallpox (Variola).

PERIOD OF INCUBATION. Ten to fourteen days.

MODE OF ONSET. Sudden; chill; high fever; headache; pain in loins, etc.

ERUPTION APPEARS. On the third or fourth day; typical evolution, about the sixth day or the ninth of the disease characteristic pustules fully formed.

ERUPTION FADES. Desiccation at the end of second week; crusts slowly separate, leaving marked and enduring cicatrices.

DANGER OF CONTAGION. So long as crusts reform; indefinitely in fomites, etc.

Disease—Varioloid (Modified Smallpox).

PERIOD OF INCUBATION. Ten to fourteen days.

MODE OF ONSET. Sudden; chill; high fever; headache; pain in loins, etc.

ERUPTION APPEARS. On the third or fourth day; typical evolution, about the sixth day or the ninth of the disease characteristic pustules fully formed.

ERUPTION FADES. Pocks do not go on to suppuration, but begin to dry up from the vesicular stage, *i. e.*, the sixth or eighth day of the disease.

DANGER OF CONTAGION. So long as crusts reform; indefinitely in fomites, etc.

Disease —Chicken-pox (Varicella).

PERIOD OF INCUBATION. About two weeks.

MODE OF ONSET. Sudden.

ERUPTION APPEARS. At once, and often in successive crops.

ERUPTION FADES. In a few days, dessicating, as a rule, without suppuration.

DANGER OF CONTAGION. Duration of danger of contagion ends with the shedding of the dried crusts.

TABLE FOR MAKING PERCENTAGE SOLUTIONS

TO MAKE FOUR FLUID OUNCES OF THE SOLUTION.

Per cent.	Grains for Exact Solution	Approximate Amount required to make 4 fl. oz.			
1-10 of 1%	1.82 grains			grains	1⅘
⅛ of 1%	2.28 "			"	2¼
1-6 of 1%	3.03 "			"	3
¼ of 1%	4.55 "			"	4½
⅓ of 1%	6.06 "			"	6
½ of 1%	9.10 "			"	9
1%	18.20 "			"	18¼
2%	36.40 "			"	36½
2½%	45.50 "			"	45½
3%	54.60 "			"	54½
4%	72.80 "	drachms	1	"	12½
5%	91.00 "	"	1½		
6%	109.20 "	"	1	"	49
7%	127.40 "	"	2	"	7
8%	145.60 "	"	2	"	25
10%	182.00 "	"	3	"	2
12%	218.40 "	"	3	"	38
15%	273.00 "	"	4	"	33
20%	364.00 "	"	6	"	4
25%	455.00 "	"	7	"	35

Distilled water q. s. to make 4 fl. oz.

DIRECTIONS.

Find in the first column the per cent. desired. The second column shows the exact amount required in grains. The third column shows the approximate amount by weight required of any salt; to this weight add distilled water enough to make four fluid ounces.

APPROXIMATE PERCENTAGE METHOD FOR DISINFECTANT SOLUTIONS.

Consider 1 ounce fluid as 500 minims. 1% = 1 grain or minim in 100 minims; for 500 minims, 5 × 1 or 5 grains would be required. Hence, a 1% solution = 5 grains in 1 ounce. A 5% solution = 5 × 5 = 25 grains in 1 ounce, etc. For ordinary practical purposes (disinfectant, etc.), 1 dram (fluid) in 1 pint of water = 1% solution. Also 1 grain in 1 ounce of water = 1 to 500. Double the water = 1 to 1,000.

AN EPITOME OF IMPORTANT INCOMPATIBLES.

Aacia (gum) with alcohol, iron, lead-water, and mineral acids.

Acids (mineral), with alkalies and relatively weak salts of other acids, such as bromides, chlorides, and iodides.

Alkalies, with acids and with relatively weak salts.

Antipyrin and antifebrin should be given with alcohol or water only.

Arsenic, with tannic acid, salts of iron, and lime and magnesia.

Bitter infusions and tinctures, with salts of iron and lead.

Bromides, with acids, acid salts, or alkalies.

Calomel, with antipyrin, alkalies, lime-water, salts of iron and lead, and iodide of potassium.

Camphor (spirit of) with water.

Carbonates, with acids and acid salts.

Chloral, with cyanides.

Chlorides, with silver salts, lead salts, and alkalies.

Chloroform (except in minute quantity), with water.

Corrosive sublimate, with alkalies, lime-water, salts of iron and lead, iodide of potassium, albumin, gelatine, and vegetable astringents. (It may, however, be advantageously combined with tincture of the chloride of iron and liq. acidi arsenosi, or with iodide of potassium.)

Digitalis, with iron and preparations containing tannic acid.

Iron (salts), with anything containing tannic acid. Tincture of the chloride of iron, with alkalies, carbonates, mucilages, and preparations containing tannic acid.

Mucilages, with acids, iron salts, and alcohol.

Potassium chlorate (and potassium permanganate) should not be rubbed up with tannic acid or other organic oxidizable substance.

Potassium (iodide of), with all strong acids and acid salts. (See Corrosive Sublimate.)

Spirit of nitrous ether, with antipyrin, sulphate of iron, tincture of guaiacum, and most carbonates.

Vegetable preparations holding tannic acid, with salts of iron and lead.

Alkaloids are precipitated or destroyed by tannic acid, alkalies, iodin or iodides, and chlorinous compounds.

Tinctures of gums or resins, with water.

BLOOD PRESSURE.

Dr. Tasker Howard says that for young people, up to 30 years of age, the maximal or systolic pressure may be considered as normal at: The age plus 110. Between 30 and 50 years, the age plus 100. Also that although Osler and French state that after 50 years of age 150 and 160 may be quite normal, the life insurance companies reject these figures. He says the minimal or diastolic pressure should be about ⅓ lower than these figures; and that the blood pressure in women averages about 10 points lower than in men.

FREEZING MIXTURES.

(THOMPSON.)

Ingredients.	Parts by Weight.	Temperature reduced from 10° C. or 50° F. to
Hydrochloric Acid . .	8	
Sulphate of Sodium . .	5	- 17° C. = + 1° F.
Snow or Fine shaved Ice .	2	
Chloride of Sodium . .	1	- 18° C. = 0° F.
Dilute Nitric Acid . .	2	
Sulphate of Sodium . .	3	- 19° C. = - 2° F.
Dilute Nitric Acid . .	4	
Nitrate of Ammonium .	5	- 26° C. = - 15° F.
Sulphate of Sodium . .	6	
Dilute Nitric Acid . .	4	
Phosphate of Sodium . .	9	- 29° C. = - 20° F.

LAWS RELATING TO THE SALE OF POISONS.

Laws of most of the States in the United States, also laws of Great Britain, practically restrict the sale of poisons, when made to others than dealers, to sales by licensed pharmacists, druggists, or chemists. They require that the bottle or package containing the poison be carefully labeled with the name of the poison, the name and address of the seller, and the word poison (usually in red ink). Laws of nearly all the States, likewise the English Pharmacy Acts, not only anticipate that the seller will use discretion in making sales, but also require him to register, in a book kept for the purpose, sales of all very active poisons. The registration includes the name and quantity of article sold, use to which it is to be put, date of sale, name and address of purchaser, with his signature and that of the seller; etc.

In the State of New York the laws virtually require the registration of all active poisons.

The new Harrison Law of the United States prohibits the sale, to the public, of cocain, of opium and of their preparations (except Paregoric) except on a physician's prescription.

In Great Britain the purchaser must be known to the vendor or introduced by some person the latter knows, and the signature of both of these must then

appear upon the registration book. The articles to be registered in Great Britain include "arsenic and its preparations, aconite and its preparations, all poisonous vegetable alkaloids and their salts, atropine and its preparations, cantharides, corrosive sublimate, cyanide of potassium and all metallic cyanides and their preparations, emetic tartar, ergot of rye and its preparations, prussic acid and its preparations, savin and its oil, strychnine and its preparations, vermin killers, if they contain any poisons or preparations of poisons which are on this list." (In Ireland, preparations of prussic acid and all vermin killers are omitted from this list.)

QUESTIONS FOR SELF-EXAMINATION.

Selected by the author from over 1,000 questions asked by him at College, and Board of Pharmacy examinations.

(Board of Pharmacy questions are in sets of 15).

N. B.—In giving doses, **write the name of the drug** and give the **minimum** and **maximum** doses.

1. Name two vegetable and three mineral emetics, and state the emetic dose of each.
2. Name a good antidote to the mineral acids.
3. What acid is considered a good antidote to the alkaloids? Why?
4. What alkaloid and what Potassium salt are considered very beneficial in Morphine poisoning? How should they be administered?
5. Which one of the mercurial preparations is most frequently employed for suicidal purposes? What is the best antidote in poisoning by it? How is the antidote used and what is formed?
6. Describe the characteristic symptoms of and give the emergency treatment for Strychnine poisoning.

7. What would you give for poisoning by any of the Barium salts? For poisoning by any of the Copper salts?
8. State what emergency treatment should be employed for poisoning by Iodine, and for poisoning by Silver Nitrate, naming the chemical antidote for each, if there be one.
9. What emergency treatment should be employed for poisoning by Carbolic Acid? For poisoning by Phosphorus?
10. What precautions should be observed in selling poisons?
11. What relation do hypodermic and mouth doses bear to each other as regards size, and why does the former act more quickly than the latter?
12. What is the dose of Antimonial Powder, Extract of Aconite, Gallic Acid, Oil of Gaultheria?
13. What is the dose of Creosote Carbonate, Red Mercuric Iodide, Sodium Bromide, Sulphonal?
14. What is the dose of Fowler's Solution, Infusion of Digitalis, Syrup of Ferrous Iodide, Syrup of Morphine Sulphate (N. F.)?
15. What is the dose of Fluid Extract of Cimicifuga, Tincture of Nux Vomica, Tincture of Veratrum Viride, Wine of Colchicum Root?

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1. By what avenues, other than the mouth, may poisons enter the system? By which one of these is the most prompt effect obtained?
2. What kinds of evidence, besides that called the symptoms, may serve to indicate the poison taken in a case of poisoning? Which of these is considered the most reliable?
3. Do all poisons produce their poisonous effects in the same time? Illustrate in answer.
4. What is meant by the local effect of a poison? Name one which has both a local and a gen-

eral or systemic poisonous effect, and state the emergency treatment for poisoning by it.

5. Name two substances which poison by being inhaled; also name two narcotic poisons, stating the emergency treatment for poisoning by them.
6. Which would be the more dangerous poisonous dose of Arsenic, a small or a large one? Explain.
7. What emergency treatment should be employed for poisoning by Laudanum? By Lead salts?
8. Name a poison, in poisoning by which, fats and oils should not be administered, and one in poisoning by which Sodium Bicarbonate should not be given. Explain.
9. Name a poison, in poisoning by which an emetic should not be given, and another in poisoning by which water should not be administered. Explain.
10. What does the Pharmacy Law direct regarding the sale of poisons belonging to "Schedule A"?
11. State the dose of Ammonium Chloride, Atropine Sulphate, Corrosive Mercuric Chloride, Guaiacol Carbonate.
12. State the dose of Ferrous Sulphate, Lead Acetate, Salol, Trional.
13. What is the dose of Antipyrine, Ingluvin, Naphtalin, Strychnine?
14. State the dose of Diluted Hydrocyanic Acid, Extract of Belladonna, Extract of Hyoscyamus, Oleoresin of Aspidium.
15. What is the dose of Deodorized Tincture of Opium, Tincture of Strophanthus, Donovan's Solution, Fluid Extract of Viburnum Opulus?

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1. Name the best chemical antidote for: Corrosive Sublimate; Lead Water; Oxalic Acid; Paris Green; Tincture of Iodine.
2. Name the best physiological antidotes, with their antidotal doses and your method of ad-

ministration, in poisoning by Aconitine; by Morphine; by Strychnine.

3. What substance is considered a good antidote to the alkaloids? Why? In what dose is it given?
4. Mention two substances which poison by being inhaled. Name two narcotic poisons.
5. Which is the more rapidly fatal poison, Potassium Cyanide or Potassium Hydrate? What emergency treatment should be employed for poisoning by each?
6. What emergency treatment should be employed for poisoning by Formaldehyde? By swallowing Chloroform?
7. Name two stimulants of different character. When is artificial respiration applicable and how is it performed?
8. State the condition of pupils and skin in Belladonna and in Morphine poisoning.
9. Name three good, vegetable emetics with emetic dose of each. What fluid aids emetic action?
10. What does the law require the pharmacist to ascertain and do when selling Carbolic Acid, Laudanum or Strychnine?
11. What proportion of the adult dose of a medicine should ordinarily be given children at the following ages: 2, 4, 8, 10, 14 years?
12. What is the hypodermic dose of Morphine Sulphate, Strychnine Sulphate? What is the rectal dose of Cocaine, Chloral, Extract of Belladonna?
13. What is the dose of Mild Mercurous Chloride, Sodium Benzoate, Strophanthin, Urethane?
14. What is the dose of Extract of Colocynth, Extract of Digitalis, Lugol's Solution, Spirit of Chloroform, Tincture of Hyoscyamus?
15. What is the dose of Acetanilid, Silver Nitrate, Sodium Salicylate, Tincture of Conium, Tully's Powder?

1. What should be given for poisoning by Mercuric Chloride? By any of the Zinc salts?
2. In Morphine poisoning, what oxidizing agent is employed and what alkaloid should be used for its physiological effects?
3. Name two different substances which may produce eschars or stains on the lips or mouth?
4. How would you determine whether a suspected powder was Calomel, Corrosive Sublimate, or Morphine Sulphate?
5. What is meant by circumstantial evidence? symptomatic evidence? chemical evidence? Which is the most reliable?
6. Describe the characteristic symptoms of and give the emergency treatment for poisoning by Belladonna. For poisoning by Opium.
7. What emergency treatment should be employed for poisoning by Paris Green? By Salt of Sorrel? What is Paris Green? What is Salt of Sorrel?
8. What antidote, and how much, should be given for poisoning by Iodine? By Lunar Caustic?
9. What is the dose, and antidote for overdose, of Mercuric Cyanide? Of Tincture of Belladonna?
10. What is the dose of Benzoic Acid, Digitalin, Salicylic Acid, Potassium Iodide?
11. What is the dose of Agaricin, Colchicin, Convallarin, Extract of Stramonium?
12. What is the dose of Creosote, Fluid Extract of Ergot, Methyl Salicylate, Oleoresin of Cubeb?
13. What is the dose of Tincture of Aconite, Compound Tincture of Catechu, Tincture of Colchicum Seed, Tincture of Ipecac and Opium?
14. How large a dose of each of the following should you consider it safe, as a rule, to dispense in a prescription: Cocaine Hydrochlorate, Extract of Physostigma, Veratrin, Wine of Opium?

15. What is the dose of Mixture of Rhubarb and Soda, Syrup of Garlic, Wine of Antimony, Wine of Ferric Citrate?

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1. Define Toxicology, Antagonist, Corrosive, Narcotic, Ptomain.
2. Upon what does the rapidity of absorption of a poison depend?
3. Describe the condition of the stomach after a large quantity of undiluted Carbolic Acid has been swallowed.
   (a) Is the corrosion superficial or deep?
4. What are the symptoms of and what emergency treatment should be employed for poisoning by Oxalic Acid?
   (a) Should the stomach tube be employed and should alkaline carbonates or bicarbonates be administered? Explain.
5. What signs and symptoms would indicate poisoning by Sulphuric Acid?
   (a) State what emergency treatment should be employed and explain regarding use of emetic, Sodium Bicarbonate and much water.
6. What emergency treatment should be employed for poisoning by Arsenic?
   (a) By Tyrotoxicon?
7. What emergency treatment should be employed for poisoning by Cocaine?
   (a) By Trional.
   (b) State the proper dose of each.
8. Name three unrelated, mineral emetics, with dose of each.
   (a) Name three unrelated poisonous alkaloids (not mentioned in this paper), with dose of each.
   (b) Name five poisonous tinctures, with dose of each.
   (c) Name five demulcents and state for what poisoning such are employed.

9. State the effect upon the heart and stomach, of the habitual, excessive use of Alcohol.
   (a) Of Tobacco.
10. What are the principal effects of the habitual use of Cocaine?
    (a) Of Morphine?

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1. Define Toxicology, poison, cumulative poison, demulcent.
2. Into what general classes are poisons physiologically divided?
   (a) Name the first subdivisions of these general classes and mention a poison belonging to each subdivision.
3. What should be done in poisoning when the nature of the poison is unknown?
   (a) By what may the effects of a poison be modified?
4. State and illustrate the difference between an antidote and an antagonist.
   (a) State and illustrate the difference between antidotal measures and antagonistic measures.
5. In what kinds of poisoning should the following be avoided: emetics, the stomach pump, the stomach tube, glycerine, milk?
6. Name a drug acting directly upon the heart and give the treatment for poisoning by that drug.
   (a) Name a poison directly affecting the stomach, and give the treatment for poisoning by it.
7. Name a common household article of which Phosphorus is an ingredient.
   (a) Should oil be used in poisoning by Phosphorus? Explain.
8. When should the following be employed as chemical or mechanical antidotes: Potassium Permanganate, Sodium Chloride, starch, Tannic Acid, Alcohol? Explain.
   (a) What is the treatment for poisoning by Wood Alcohol? By Opium?

9. State the emetic doses of two vegetable and of three mineral emetics.
   (a) What is ordinarily the largest safe dose of Aconitine, Paraldehyde, Dover's Powder, Heroin, Phenacetin?
10. What are the symptoms of and what is the proper treatment for poisoning by coal gas?
   (a) Name a poison which uniformly produces blindness, more or less permanent.

MISCELLANEOUS COLLEGE AND BOARD QUESTIONS.

1. What effect does the dilution of a corrosive poison have upon its local effect?
   (a) If an ounce of Carbolic Acid, well diluted, were swallowed, would life be endangered? Explain.
   (b) What is the official antidote for poisoning by Arsenic, and how is it prepared?
2. What is the best chemical antidote for poisoning by Silver Nitrate, and what does it do?
   (a) For poisoning by Chloral and what does it do?
   (b) For poisoning by Verdigris?
   (c) What symptoms would cause you to suspect Opium poisoning?
3. Is it the absorbed poison in the circulation, or the unabsorbed poison in the stomach, which causes death by a true poison?
   (a) What is the proper demulcent antidote to employ when Chlorine preparations have been swallowed?
   (b) What Sodium salt should also be used?
4. What emergency treatment should be employed for poisoning by swallowing a Formaldehyde solution?
   (a) For poisoning by Hyoscyamus?
   (b) By Ice Cream?
5. Name a good physiological antidote for poisoning by Aconite, and tell how to use it.
   (a) How may Oxalic Acid be distinguished from Epsom Salt?

(b) Should water be used in poisoning by Oxalic Acid or by Oil of Vitriol? Explain.

6. With what substances does albumin form more or less inert compounds?
   (a) Describe the method of using it.
   (b) What precautions are to be observed in employing it in poisoning by Corrosive Sublimate, and why?
7. What are the principal symptoms produced by a toxic dose of Strychnine?
   (a) State the emergency treatment for poisoning by Strychnine, giving the object of each procedure in the treatment?
8. Should the following prescription be dispensed? Explain.

   ℞ Heroin, gr. 2½
   Codeinae Sulph.
   Ext Hyoscyami, aa gr. 10
   Pulv Tully, drm 3
   M ft in caps No. XXIV.
   Sig. Two every 2 to 4 hours.

9. If a wineglassful of concentrated Hydrochloric Acid were swallowed would death be likely to result if no treatment were employed? How could you tell it was not Carbolic Acid instead of Hydrochloric?
10. Which is the more rapidly fatal poison, Potassium Cyanide or Potassium Hydrate? To what is the effect due? What emergency treatment should be employed for poisoning by each?
11. By what chemical tests or means would you identify the following: Mercuric Chloride; Morphine; Antipyrine; Strychnine?
12. Poisoning by what drug would be indicated by the following symptoms: flushed face, thirst, dry fauces, double vision, dilated pupils, giddiness, delirium and stupor? What treatment should be employed?
    (a) In true poisoning by coal gas, where is the poison and what treatment should be employed?

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Vehicles

1. aqua
   - aqua anisi
   - aqua cinnamomi
   - aqua menthae piperitae
   - aqua menthae viridis
   - aqua foeniculi
   - aqua rosae

2. syrup
   - syrupus aurantii
   - syrupus acidi citrici
   - syrupus pruni virginianae
   - syrupus tolu
   - syrupus rhei aromaticus
   - syrupus glycyrrhizae
   - syrupus zingiberis
   - syrupus sarsaparillae compositus
   - syrupus ipecacuanhae

3. Elixir
   - Elixir aromaticum
   - elixir glycyrrhizae

4. Spirit

spiritus anisi
spiritus lavandulae
spiritus menthae piperitae
spiritus menthae viridis
spiritus cinnamomi
spiritus aurantii compositus

5. Tinctures

Tinctura aurantii amari
Tinctura aurantii dulcis
Tinctura limonis
Tinctura cardamomi
Tinctura cardamomi composita
Tinctura lavandulae "
Tinctura vanillae
Tinctura gentianae Composita
Tinctura Calumbae
Tinctura tolu
Tinctura zingiberis

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